

THE
SOUTHERN
FARMER'S, GARDENER'S,
AND
FRUIT RAISER'S
GUIDE

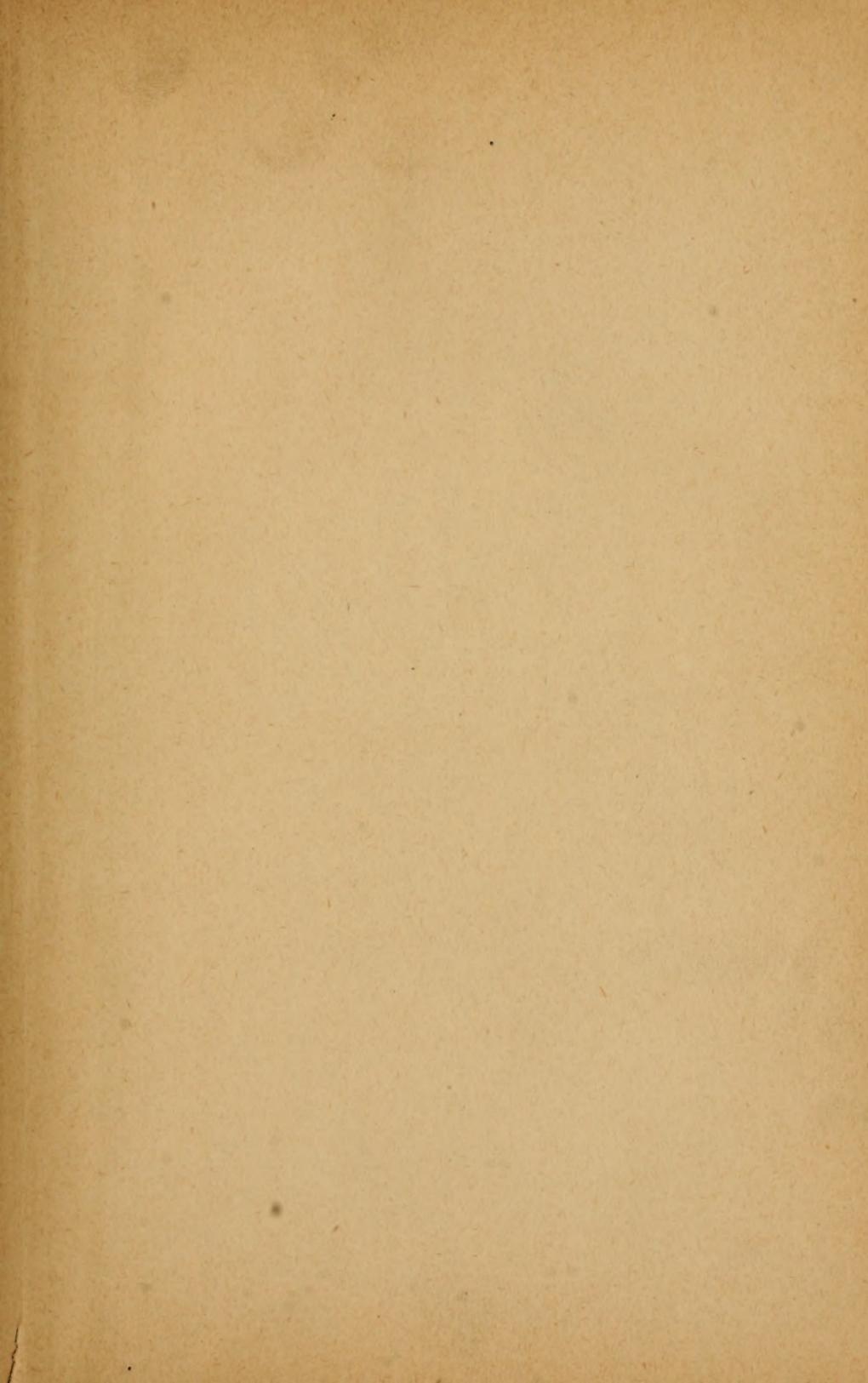


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The Southern Farmers' Gardeners' and Fruit Raisers' Guide



What, How and When to Plant
in the South for Profit.



Written and Compiled by
E. M. PHILLIPS,

Author of "Documents in the Case," "What Does the Man Want?" Etc.

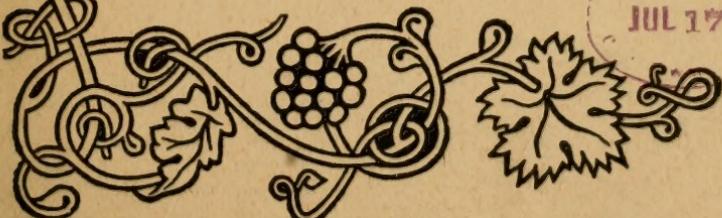
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INDEX.

PAGE.		PAGE.	
Alfalfa	17	Carbolic Acid Wash.....	406
Almonds	272	Carrots	173
Apples.....	202	Cattle at the South	330
Autumn and Winter Keeping.....	215	Cauliflower and Broccoli.....	177
Borer.....	218	Cauliflower and Lettuce	179
Budding.....	212	Celery	140
Cleft Grafting	214	Cementing Cellar Floors	328
Codling Moth	218	Cement for China, etc.....	391
Cultivation of Orchards.....	205 and 216	" " Fruit Jars.....	393
Diseases	222	" " Furniture, etc.....	392
Distance Apart of Trees.....	206	" " Leather, etc.....	391
Early Varieties	215	Cereals	43
Enemies of.....	217	Chapped Hands, Cure of	375
Growing Grafting Stocks.....	208	Chestnuts, American	272
Leaf Blight	222	" Japan	273
Leaf Crumpler	220	" Spanish	273
Propagation	207	Cherries	242
Protection from Sun Scald	205	Chill and Fever Remedies	371
Pruning	226	Clover, Alsike	28
Root Grafting	209	" and Bermuda Grass	7
Scab and Bitter Rot	223	" Alfalfa	17
Setting Out Orchards	204	" Crimson	30 and 409
Woolly Aphis	217	" Japan	32
Apricots	266	" Red	26
Artichokes, Jerusalem	42	Cold Frames	312
Asparagus	135	Colorado Potato Beetle	102 and 410
Balky Horses	343	Colts, How to Break them	342
Barley	57	Colt Distemper	334
Basket Willows	298	Colic, Cramp of Horses	335
Beans, Bush	166	" Flatulent	336
Beans, Pole	170	Corn, Field	51
Beef, to Salt	398	" Sweet or "Sugar"	171
Beets	174	" Seed, Selection and Care of	53
Berries	251	" Jerusalem	69
Blackberries	257	" Kaffir	69
Cranberries	262	" Millo Maize	69
Currants	258	" Level Culture of	54
Gooseberries	258	Cotton Seed and Meal Fatal to Pigs	353
Mulberries	260	Cowpeas	18
Raspberries	255	Cowpea Hay	20
Strawberries	251	Cowpeas and Crabgrass as a Combined Hay Crop	24 and 409
Black Walnut Groves	270	Cowpea Hay Stacking	21 and 22
Broom Corn	276	Cowpeas as a Manure	45
Buckwheat	64	Cucumbers	153
Budding Fruit Trees	212	Currants, Red and Black	258
Butter, How to Keep Hard	361	Diseases of Horses and Mules	332
" Making at the South	356	Dyeing, Hints on	382
Cabbages, Two Crops per Annum	110	" Black	383, 387 and 390
Cabbage Worms	112		
Cantaloupes (or Muskmelons)	200		

S505
P55

INDEX.

	PAGE.
Dyeing, Blue	385, 388 and 390
" Cotton Goods, Blue with Log- wood	388
" Cotton, Cheap Blue	388
" " Black	387
" " Bright Orange	389
" " Green	389
" " Light Blue	388
" " Red	390
" " Yellow	389
" Green	384 and 385
" Lac Red	386
" Madder Red	384
" Orange	386
" Pink	385
" Purple	386
" Silver Drab	387
" Scarlet with Cochineal	385
" Snuff Brown	384
" Wine Color	384
Eggs, to Tell the Sex of	364
" to Keep them Fresh	364
Egg Plant	189
Epizootic, or Influenza	333
Fat Cattle at the South	330
Fertilizers, Commercial	75
" " Mixing of	77
Fruits	202
Farmers' Shipping Clubs	320
Figs	261
Filberts and Hazel Nuts	275
Flax	296
Founder	340
Geese, Emden and Common	365
Gestation	356
Glanders	334
Gooseberries	258
Grafting, Root	209
" Cleft	214
Grafting Wax	403
Grapes	245
" Modes of Culture	246
" Diseases	249
" Location and Soil	249
" the Scuppernong	250
" Varieties for the South	245
Grasses	5
Grass, Bermuda	6
" " to Destroy	8
" " and Red Clover Com- bined	7
" Johnson	14
" Blue	35
" Red Top	33
" Orchard	37
" Texas Blue	37
Grass, Timothy	16
" Virginia Blue	37
Grasses and other Forage Crops for the South	5
" How to Secure a Good Catch on Light Soils	39
Hams, to Cure	398
Ham in Slices to Keep a Long Time	399
Health at the South	368
Heaves	338
Herds Grass, see Red Top	33
Horse Ointment	341
Hotbeds	310
How to Give Medicine to Animals	332
Insecticides	405
Kerosene Emulsion	405
Tobacco Spraying Mixture	406
Carbolic Acid Wash	406
White Hellebore	406
Acetate of Lead	407
Introduction	I
Kaffir Corn	69
Kohl Rabi	188
Land Plaster	75
Lettuce	179 and 186
Lime and its Uses	74
" on Grain Lands	318
" on Grass Lands	39
Liniment	341
Live Stock	330
Lice on Farm Stock	348
Lockjaw	340
Manures and Fertilizers	72 and 312
Marls as Fertilizers	315
May-Apple, Extract of	373
Melon, Musk	200
" Water	193
Millet	25
Millo Maize	69
Mulberries	260
Mushrooms	182
Mustard	201
Notes and Comments	409
Number of plants per acre, at a given distance	408
Nut Bearing Trees	267
Oats	60
" as a Combined Crop	61
Okra	185
Onions	126
" to Keep Through the Winter	129
Osage Orange Hedges	293
Paint, Cheap, Without Lead	408
Parsnips	181
Peaches	227
" Disease and Enemies	231

INDEX.

	PAGE.
Peaches, Packing and Shipping.....	233
" Lists for the South.....	229
Peas, Early Green	163
Peanuts.....	184
Pecans.....	267
Peppers.....	186
Pears.....	237
" Mode of Ripening	241
" Varieties for the South	241
Pigs; Young, Care of.....	350
Plants; Number of at a Given Distance per Acre	408
Plums	234
" Enemies of	235
Plenty of Drinking Water for Hogs	353
Plowing, Deep or Shallow	49
Plow, Scooter with Heel Scrape	11
Potatoes, Irish.....	84
" Deep Planting of.....	90 and 409
" Insect Pests	102
Potatoes, Diseases of	97
" Late, for Table Use.....	89
" Remarkable Growing	92
" Rural New Yorker's Method..	89
" Second Crop.....	86
" Sweet.....	105
Potato Beetle	102 and 410
Poke Root for Felons, etc.....	373
" Berries for Rheumatism	375
Poultry, Feeding for Eggs	361
Pumpkins	197
Quinces.....	244
Rabbits, to Trap Them	376
" to Keep Them from Trees	379
Radishes.....	177
Ramie	305
Raspberries	255
Rats, to Kill them	380
Red Top Grass	33
Rice, Upland	55
Rhubarb, or Pie Plant	264
Root or Fruit Cellars	326
Salsify (Vegetable Oyster)	187
Salting Cattle	349
Seed and Seed Sowing	78
Seeds, Duration of Vitality of	81
" Time for Sowing	82
Snake Bites, Cure for	374
Soap, Hard and Good	402
" " White	402
" Soft	400 and 402
Sorghum Fodder	34
Sorghum Molasses or Sugar	288
" Non-Saccharine	69
Spaulding's Prepared Glue, Imitation ..	392
Spavin and Ringbone	339
Spinach	201
Spraying Recipes	404
Copper Sulphate Solution	404
Bordeaux Mixture	404
Ammoniacal Solution	405
Kerosene Emulsion	405
Tobacco Spraying Mixture	406
White Hellebore	406
Acetate of Lead	407
Spraying Peach and Plum Trees	232, 410
Squashes	198
Stables, How to Build	345
Stile	339
Stone Walls Without Cement	329
Strawberries	251
Sweet Corn for Syrup	292
Sweet Potatoes	105
" Kiln Dried	325
Tanning Deer Skins	393 and 395
" Fur Skins	393 and 394
" Calf Skins, etc.	396
Tea and Silk Culture, Remarks on	307
Teosinte	66
Time to Plow at the South	308
Tomatoes	158
" for Winter	162
To Make Cows Easy Milkers	348
To Make Fish Bite	380
Tobacco, Modes of Culture	281
" Curing	286
" Bulking	287
" Worms, to Poison Them	285
Trapping Minks, etc.	379
Truck Farming	70
Turnips	172
Vegetables	84
Vinegar	407
Walnuts, Black	270
" English	271
" Japan	274
Watermelons	193
Watering Horses	343
Weevil, to Destroy in Seed Beans, etc.	171
Willows, Basket	298
Windmills and Irrigation	319
Winter Pastures	35
Winter Rye	41
Wheat	43



Introductory.

 NEW era has commenced in the South in agriculture and horticulture. The great natural resources and advantages of this part of the country, in soil, climate, seasons, and crops are being recognized and utilized as never before.

Instead of the old plan of growing only cotton and corn, and buying everything else, it is now the policy, and found to be to the profit of every progressive Southern farmer, to diversify his crops; and if development in this direction is kept up, and it certainly will be, the South will soon become practically independent in the matter of agricultural and horticultural products; and not only is this true, but this crop diversity, instead of lowering the fertility of the soil until it is fit for nothing but to be turned out as "old fields," given over to sedge grass, and not considered worth a dollar an acre, will if skillfully handled make it more productive and valuable from year to year, and in this way the value of Southern farms will be increased hundreds of millions of

dollars, lands will sell for better prices, and the whole South become richer.

Another element of Southern progress is found in the fact that great numbers of sturdy farmers are now leaving the Northern States and locating in the South; finding homes here where there are such inviting conditions, where lands are still so remarkably cheap, and where the climate is mild and delightful, contrasting so favorably in this respect with that of the countries from which they have emigrated.

This is an inviting land to come to. The immigrant does not suffer here the hardships which confront him in many new locations. In the South he will find drinking and stock water plentiful and excellent almost everywhere, rains seasonable, irrigation unnecessary, winters short, summers delightful, health unsurpassed. The difference between a hard winter of six months and a mild one of six weeks is readily appreciated.

Here timber for building, fencing and fuel is abundant, and the immigrant can build his own house with his own materials, even to the foundations, root cellars and chimneys, for good building stone is found in almost every part of the South. Here failures of crops are virtually unknown, and with fruits and vegetables in plentiful supply, and pasturage for his cattle with small expense the year round, the incomer may lead a joyful life.

The early springs give the farmer, gardener and fruit raiser the cream of the market in prices on all products shipped North, and with late falls, and frosts long delayed, ample time is given for double cropping, and in many cases treble cropping the same season.

The advantages possessed by the South in the department of stock-raising—namely : in a mild, salubrious climate, permanent pastures, and cheap fattening foods, are very great. It is a fact now well known and established, that a fat ox or hog can be put on the market at from one-third to one-half the cost of those raised in the North or Northwest, although they are equal in value and quality, and bring the same prices as those Northern raised.

Having resided in the South for over a quarter of a century and having traveled all over it, from Virginia around to the southern border of Texas, and from Kentucky down to Florida, the writer feels that he is prepared to judge truthfully and correctly of the resources, crop possibilities, healthfulness, friendliness of the people and general desirability of this good land, especially as he compares it with Illinois, New York and Old England, where the earlier years of his life were spent.

The writer cannot, of course, claim to know all that is herein stated of his own knowledge and experience ; he has availed himself largely of the researches, experiments and discoveries of others, and is especially under obligations for many facts given, to the Agricultural Experiment Stations, located in the South, and desires to make especial mention of the aid so kindly given by Professor R. L. Bennett, director of the Agricultural Experiment Station, at Fayetteville, Ark.

To all those who have so generously aided him in the preparation of this work, the writer desires to express his grateful obligations.

Nothing is set down here extravagantly, the design has been to understate rather than overstate Southern crops and advantages. This book is written with the desire to help

those who wish to diversify their crops and learn of new sources of profit, and to emphasize truthfully the favorable features of Southern agriculture.

To the progressive Southern farmer and fruit raiser, the enterprising market gardener, the man who believes in an all-around, fruitful Southland, and desires to develop it "for all it is worth," and to those who have lately moved into the South, or who are investigating the question of migration hitherward, who are tired of cold winters, blizzards and droughts, this book is respectfully dedicated.

E. M. P.

Little Rock, Ark.





PART I.

• Grasses •

AND OTHER FORAGE CROPS FOR THE SOUTH.



THE cultivation of grasses, both for hay and pasturage, is considered by all prominent agricultural authorities of America and Europe as the foundation, the corner stone as it were, of good farming.

The South is eminently a grass country, having hundreds of varieties of native grasses, and while it is found that the cultivated grasses of the North do remarkably well, other excellent varieties that cannot be grown at the North, also thrive here and are exceedingly profitable.

Every farmer in the South then, should have his permanent pastures and meadows, and the old practice of "pulling corn fodder" should be abandoned as obsolete. The raising of abundant crops of hay and grass at the South is no longer an experiment, and it is proven that bountiful supplies of nutritious fodder can be produced at the South with infinitely less labor and expense than by the old corn fodder pulling system.

In the South also, cattle and hogs can be much more cheaply raised and fattened than at the North, as any one investigating the subject will find, and of which fact we hope to thoroughly convince the readers of this book.

All the beef and pork products, the fresh and corned beef, the bacon, lard and hams, used at the South should be and will soon be raised here; they can certainly be produced here at less expense and of as good quality as at the North, and with the great extension of grazing and forage raising, now opening out in every Southern State, the dairy products, the butter and cheese, can and will be made here.

Certainly the time has come when the many millions of dollars that are annually sent North for bacon, hams, lard, choice beef, butter, cheese, etc., should be retained at home. Cotton, though not by any means given up, must take a back seat, and pastures, meadows, grasses, clover, corn, cattle, hogs, sheep, cowpeas, creameries and cheese factories, come to the front.

The old German adage runs thus: "No grasses, no cattle; no cattle, no manure; no manure, no farm." Pastures, meadows, grasses, fodder plants, cattle, creameries, grain, potatoes, fruit, beef and hogs, should be the rallying cries of the South. There is as good money in these as there ever was in cotton.

BERMUDA GRASS.

As a permanent pasture grass at the South, Bermuda is unexcelled. It furnishes an abundance of rich, sugary herbage, of which cattle, horses, hogs and sheep are very fond.

The method of propagation is very simple and inexpensive. Small pieces of the plant are dropped 3 or 4 feet apart and pressed in with the foot, on land that has been well

plowed and harrowed. Another plan is to cut the Bermuda sod up in a hay cutter or chop it with a hatchet, scatter it over the ground, and harrow, or harrow and roll it in. Do not let the seed plant get too dry before planting, and you will have no trouble in getting it to grow. It will cover the ground with a strong sod, and when once established it is permanent. When the ground is damp in the spring or fall, is of course, the best time to plant.

It is not necessary that the soil be rich, it will thrive on sandy land, or poor pine hills, but of course grows faster and produces more feed to the acre on good, rich soil, than on poor, just as any other forage plant will, still it is marvelous how it thrives on poor land, and what an immense yield of excellent pasturage it affords. Droughts, close feeding and tramping cannot kill it, in fact do not seem to harm it much.

It affords a vast amount of the best pasturage for nine months in the year; and while it is not considered a hay grass, yet on good soil it grows tall enough to cut for that purpose, and will yield 2 to 4 tons of hay in a season. It is a much more profitable grass, either for pasturage or hay, than Timothy, as it is perennial, costs nothing for seeding, and yields a greater tonnage when cut. On a dairy or stock farm, it is almost invaluable at the South.

BERMUDA AND RED CLOVER COMBINED.

Should you at any time wish to enrich the soil it grows on, run a harrow over it in the winter, or run over it with a bull-tongue plow, and sow it rather thinly to clover, which will catch splendidly on the Bermuda sod, and grow finely with it as a combined crop, enriching the ground at the same time. The second year, by keeping cattle off from

it, you can mow the field, which will give you a large crop of most excellent hay.

METHODS OF DESTROYING BERMUDA GRASS.

Some of our farmers are afraid to plant Bermuda, fearing they may not be able to kill it out and get rid of it finally. We answer this by asking, what is the use of wanting to get rid of such a valuable and inexpensive pasture as this; one that, in the first place, never wears out, and costs almost nothing for seeding?

If, however, you insist on getting rid of it, do not try to plow and cultivate it out, that, if not impossible, is a hard thing to do. The better way is to sow it heavily to cowpeas as early in the spring as danger from frost is gone, and as soon as they are ready to harvest, break the ground again and sow to the same crop.

The Agricultural Experiment Station, at Fayetteville, Ark., gives in its very valuable bulletin No. 28, the following methods for the destruction of Bermuda grass:

"When Bermuda takes possession of a piece of ground, it forms a most compact sod and is eradicated with considerable difficulty, but less than is generally supposed when treated in the proper manner. As remarked, portions of the station property were well sodded in this grass. Different methods were resorted to for the purpose of destroying it. An area was divided into five plots and treated as follows:

"Plot 1. Plowed and cross plowed with scooter at intervals of from one to three weeks, each plowing followed by harrow.

"Plot 2. Plowed and cross plowed with 14-inch heel-sweep at intervals of from one to three weeks, each plowing followed by harrow.

"*Plot 3.* Planted in oats in February, oats harvested in June and plot immediately treated as plot 1.

"*Plot 4.* Planted in oats in February, oats harvested in June and plot immediately treated as plot 2.

"*Plot 5.* Planted in oats in February, oats harvested in June and plot immediately plowed and cross plowed with scooter and harrowed. One week later planted in cowpeas sown thick in $2\frac{1}{2}$ foot drills. Peas cultivated twice with heel sweep and harvested for hay in September, when plot was again broken with scooter, and harrowed.

"The results were very satisfactory on all five plots, the grass being practically destroyed, particularly on plots 2 to 5 inclusive. On plot 1 the destruction was not so complete. The first two plots were given the same treatment and at the same time, except that the plowing was done with scooter on plot 1 and with heel sweep on plot 2. Throughout the experiment there was more grass on plot 1 than on plot 2, indicating that the heel sweep did more effectual work than the scooter. The heel sweep passing under the propagating parts of the plant and cutting the feeding roots left it in a better condition to be harrowed to the surface and killed by the heat of the sun. The scooter cut the sod into a greater number of pieces, but did not sever the fibrous roots which held the plant and made the work of the harrow less effective. As soon after each rain as the soil was sufficiently dry for work, plots 1 and 2 were subjected to a repetition of the above treatment, and again in dry weather, at intervals of from one to three weeks, or as soon as any growth appeared, whether Bermuda or other grasses, or weeds. Such a quantity of the dead Bermuda remained on the surface after the

first harrowing that it was raked into piles, some of which was put in gullies and the other burned.

"The oats on plots 3, 4 and 5 had begun to cover the ground before the Bermuda had made much growth, and when it appeared it was upright, as much so as the oats, and did not spread upon the surface of the soil as it did on plots 1 and 2. The oats served the purpose of not only preventing the Bermuda already there from spreading, but made it more succulent and tender by shading and vastly more susceptible to the effects of plowing, harrowing, and the heat of the sun (when the oats were removed), the combined effects of which left very little after the first treatment. A week later the peas were planted on plot 5 for the purpose of giving the grass, should there be any left, a second shading followed by exposure to the hot sun. The rows were 30 inches apart and the peas planted continuously in the drill. The peas were cultivated twice with 18-inch heel sweep, two furrows being run the first and one the second plowing. A warm, dry day in September was selected for the harvesting of the peas for hay. The vines were removed as soon as cut and the plot plowed with heel sweep and harrowed. There was no grass on the plot when the peas were removed. The alternate shading and exposure to the hot sun in dry weather proves most effectual in killing Bermuda, particularly when the exposure to sun is accompanied by a thorough scarification of the surface of the soil.

"The turning plow is not infrequently used for fighting Bermuda and generally with poor results, unless the plow is run shallow. This plow is used in the fall of the year and it is expected to bring the grass to the surface to be killed by freezes. If the plowing is done deep this object is defeated,

for the grass (a portion of it at least) is turned under and not up, and really planted again; but if the plowing is shallow the propagating parts of the plants are left near the surface, and if dragged out by the harrow, may be killed. If this is done in dry, hot weather, the results are satisfactory, particularly so if the grass has previously been well shaded by some growing crop, such as oats, rye, barley, peas or millet, but for the complete destruction of Bermuda sod, however thick, I recommend the following treatment:

"Break close with scooter (bull-tongue), cross plow with 14-inch heel sweep and harrow thoroughly. A few days later harrow in rye or barley in the fall or oats in the spring. Cut grain for hay and remove from ground. Break again with scooter and heel-sweep as before and harrow in dry weather. If grass is not all killed, plant peas (whippoorwill or unknown cowpeas) thick in $2\frac{1}{2}$ or 3 foot rows and cultivate frequently with heel sweep until peas lap across rows. If grass still remains, which is very improbable, cut pea vines and plow and harrow again. The plowing in all cases should be thorough, no unbroken places being left. By this treatment the Bermuda will be destroyed and the labor employed for its destruction will have produced two crops in one year on the same soil, either of which will pay for the labor expended for the production of both, and the Bermuda killed incidentally and without cost."

SCOOTER PLOW AND HEEL SCRAPE ATTACHMENT.

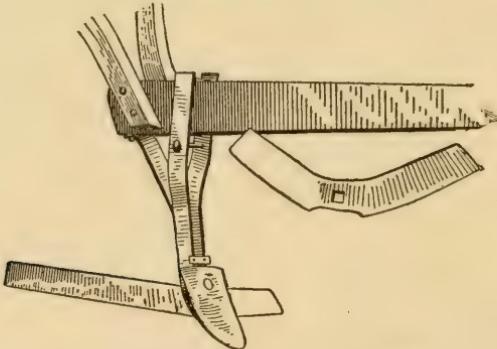
These implements are mentioned frequently in this book and it may be well to describe them, as the names, if not the articles, may be new to some. The names are those adopted by the Agricultural Experiment Station at Fayetteville, Ark.,

and we give below an engraving of them, loaned to us by Professor Bennett, and his description taken from the station bulletin No. 31.

The *scooter* will be readily seen to be the old-fashioned, narrow bladed, bull-tongue plow.

We quote from the descriptions as given by Professor Bennett, as follows :

"In view of the efficiency of the heel scrape for cultivating crops, especially cotton and corn, to destroy noxious vegetation and to mulch the soil to conserve moisture, I display below a cut of the two tools, attached to and detached



HEEL SCRAPE AND SCOOTER.

from a single stock. They can be used on a walking cultivator just as well as on a single stock. The scrape can be attached under the scooter in front of the foot of the stock; but it does not run so level or satisfactory as when attached behind the heel of the foot. The depth of the furrow and inclination of the wings can be regulated by the back band, the foot of the plow where it is attached to the beam, and by the clevis. The clevis should be moved first when necessary to regulate the scrape. The scrapes shown in the cut are 16 and 24 inches long and $2\frac{3}{4}$ inches wide.

The scooter is 7 inches long and $3\frac{1}{2}$ inches wide. I think when the scrape and scooter are once used and understood, they will supersede other and more expensive and less effective plows now in general use in the State for cultivating crops.

"I have taken from bulletin 27 a description of the scrape and how to make it.

"The Scrape and Scooter.—I have found them, when used together, to be one of the best implements for shallow cultivation of corn and cotton. They can be attached to a single stock or to a cultivator. The scrape can be made any length, and for all plowing after the first they are used from 18 to 24 inches long, that is, they will cut that width of surface. The scrape should run level, and is held steadily in the ground by the short scooter. The best work is done when the scrape is attached to the heel of the foot. They are inexpensive, easily sharpened, of light draft and do the most efficient work. If the scrape is not found in all small markets it can be easily made in any blacksmith shop. A piece of steel about one-quarter of an inch thick and about $2\frac{1}{2}$ inches wide, and cut to any length desired, is sufficient. One edge is sharpened, a hole made in the middle for the heel bolt, and from about 1 to $1\frac{1}{2}$ inches on each side of the center of the hole, bend the two ends back to an angle between 30 and 35 degrees. The cutting edge should be made so that when placed upon a level surface all parts of it will touch the surface. The top edge is then inclined backward so as to place the lower cutting edge in a cutting position. In this shape the scrape easily cuts all tap-rooted vegetation and at the same time lifts the soil, allowing it to fall over behind the scrape in a thoroughly pulverized condition. By

the use of a long scrape, when corn and cotton are advanced in growth, cultivation can be done close to the stalks without breaking the limbs, and the short scooter is far enough off so as not to disturb any large roots. With it two furrows will thoroughly cultivate each middle, leaving no ridge of soil, but instead a level surface. The scrape is so effective in its work, that when used a greater part of the costly and unbeneficial hoeing is avoided.

"Cultivation of crops is not done to break the soil, for it is presumed the soil was thoroughly broken before planting. If, however, rains or other agencies harden or pack the soil after planting, the breaking should be done at the first working and not afterwards. The essential things in cultivating crops are to prevent grass and weeds from growing and to keep the surface soil in good tilth or mulched with loose earth. To accomplish these things deep plowing is not only unnecessary, but harmful. In cultivation only the surface soil should be worked, and implements used that will do that thoroughly. If soils are well drained the seed bed should be low to allow level and shallow culture. When the beds are high, deep and high cultivation is almost unavoidable. Besides the importance to the crop of shallow and level culture, the easier draft and speed obtained in it is also important."

JOHNSON GRASS.

FAVORABLE AND UNFAVORABLE POINTS.

This is one of the most wonderful hay grasses of the world. It grows from 8 to 10 feet tall on good ground, and can be propagated either from the roots or from seed. It should always be cut when half grown. Being a member of the sorghum family, it has a sweet juice, and stock are ex-

ceedingly fond of it. It is a very fattening and healthy food, keeping stock in prime condition.

It can be cut profitably four or five times in a season, yielding from 5 to 8 tons per acre, according to the richness of the soil, and the hay should bring as good price in the market as Timothy, as government experiment tests show it to be richer in fat and flesh producing elements than Timothy hay.

It is a perennial grass, like the Bermuda, and when once established all expense and care of it ceases, excepting as to cutting and curing of the hay. Getting fodder in this way is much easier and less expensive than "pulling corn fodder." A big barn full of Johnson hay can be secured at less cost than it takes to pull, tie up and stack 200 bundles of corn fodder; and a barn full of Johnson hay means fat calves, cattle and horses in the spring. We advise all our Southern farmers to try a few acres of this wonderful and easily grown forage plant.

A few words of caution should be added. *It should not be left to ripen its seed* so that it can spread itself by this means where it is not wanted, for once in the ground it is very hard to eradicate. It will take the entire farm if allowed to seed itself. It is best not to sow it close up to fences, where it can get into fence corners, go to seed and catch over in the next lot. Better leave a belt of land 20 or 30 feet wide all around the patch next to the fence and plant that in corn, potatoes or field peas—anything that will keep the Johnson grass out of the fence corners.

TO KILL JOHNSON GRASS.

If, however, it should be found that the ground it occupies is needed for some other crop, or it has established itself

where it is not wanted, the directions given above for the eradication of Bermuda grass, will apply with slight modifications to Johnson grass. Break the ground thoroughly in midwinter, and *cross-plow with heel sweep*, to sever the tough root connections, harrow thoroughly and sow heavily with oats early in the spring, so that the grass stems may be dwarfed and made juicy and tender by the shade of the oats. When these are well grown cut them for hay, and plow up the stubble well with scooter and heel sweep, as at first; then harrow thoroughly, and drill in a heavy sowing of cowpeas, the rows being 30 inches apart; cultivate once or twice to give the peas a good start, and when these are ripe and harvested the scooter plow and heel sweep should be run through again, and if all the grass does not then prove to be killed, sow the field to crimson (not red) clover (see page 30), which will doubtless finish it, and your land will then be in excellent condition to plow and plant to potatoes in the spring, and you will have harvested two or three crops of good hay while killing out the Johnson grass.

These two grasses (Bermuda and Johnson grass) will supply Southern farmers with abundant and excellent pastureage and hay, but if a diversity of feed is desired, or fine hay to sell at a good price in some town near by, put a few acres into

TIMOTHY GRASS.

This plant is generally grown for hay, and not as a pasture grass, but when sown in connection with red clover it does well for that purpose. In fact this is probably the best way to grow it, for either pasture or hay; and while it does not produce here, when sown by itself, as great a tonnage of hay as some other varieties do, yet when combined with

clover it produces a hay of much higher feeding value, and better liked by stock, than clover alone.

It should be sown in the fall, in September or October, mixed with the clover seed, in the proportion of 1 pound of clover to two-thirds of a pound of Timothy.

Sandy soils are not suited to the growth of this grass. Clay or clay loam soils give the best results. A good and deep preparation of the soil is desirable, and the surface should be rendered fine and mellow by harrowing. If sown in a wet season very little covering will be necessary. A good plan is to mix the combined seed with dry wood ashes, sow broadcast and give it at once a light harrowing. If the weather is dry and likely to remain so, a more thorough harrowing should be given, that the seeds may be covered more deeply; or the seeding can be done to good advantage with a seed drill.

Timothy to be cut for hay should not be allowed to ripen its seed; it should always be cut in the bloom. Ten to fourteen pounds of the mixed clover and Timothy seed are required per acre. Timothy seed alone costs from 5 to 10 cents per pound according to quantity bought.

ALFALFA.

It is a mistake to suppose that this valuable food plant will only thrive in California or Colorado, where it can be irrigated. It grows splendidly in the South wherever the land is rich, or is made rich by fertilizers, and is thoroughly and deeply plowed, and pulverized by harrowing.

Alfalfa will not do well at the North, it thrives best in a warmer climate, and succeeds admirably on any of the varieties of soil found here, such as rich bottom land (if well

drained), red clay, yellow clay, clay loams, black or chocolate sandy, light sandy, or on soils with limestone base like those of Texas, Alabama and some parts of Arkansas and Virginia.

This plant should never be pastured; but cut and cured, or fed green, and should not even be cut the first year, as the great thing is to secure a good stand; after it is once established it is good for twenty years, and will yield from 5 to 10 tons of hay, or 30 tons of green feed, per acre; and 1 acre will keep five horses, mules or cows in prime condition the year round, or will feed and fatten as many hogs as 3 acres of average corn. It should not be sown in a shady place—it likes sunshine—*neither should a wet and poorly drained piece of ground be selected.*

In order to secure a good stand, drill in the seed in rows 18 inches apart, early in the spring, or in September, and keep it clean with small horse hoe or cultivator. After the first season it will take care of itself, and is ready for use very early in the spring and can be cut three or four times each year; but it is best to leave a good growth on the ground in the fall, to act as a winter protection.

Twenty pounds of seed are sufficient to sow per acre, and cost from 10 to 15 cents per pound, according to quantity bought.

Alfalfa ought to be raised all over the South, it is much more easily raised than cotton or corn, and when once established is permanent and costs nothing but the cutting and curing.

THE COWPEA.

This is not exactly a pea, but more properly belongs to the bean family. It is becoming known as a highly valuable fodder and fertilizing crop. If desired the pods may be har-

vested for the grain, and the plants plowed under to fertilize the soil. The seed or grain is ground and used for cattle feed; the stalk and leaves also make excellent fodder, fed green. Poor, sandy land may be greatly improved by plowing under a crop of cowpeas, and thus made into a fertile loam. Plant in a thoroughly pulverized soil. If wanted to plow under for manure, sow with a grain drill, in drills a foot apart. If grown for fodder or the seed, plant $3\frac{1}{2}$ feet apart and cultivate thoroughly. The seed must not be sown until the soil has become thoroughly warm. It takes from $1\frac{1}{2}$ to 2 bushels to sow an acre, costing from \$1.50 to \$2 per bushel.

This Southern fodder plant has great value in several ways. It furnishes a heavy growth of green feed of a highly nitrogenous character, and with care to prevent its heating and moulding, can be cured, forming an excellent hay.

Two crops will mature on the same ground in one season in the South. The peas are a valuable food for man or beast.

As a fertilizer, to be plowed under, either green or dry, this plant is not surpassed by clover or any other known vegetable growth; even the roots which remain in the ground after each crop is harvested, contribute to the fertilization of the soil; and this plant can be profitably grown after oats, wheat, or other grain, to better the condition of the land for the next season's crops.

At the Agricultural Experiment Sub-station, at Newport, Ark., it was found that cowpea vines, with pods on the vines, plowed under, increased the yield of wheat over 250 per cent above unmanured land, while vines with the pods off increased it 200 per cent, and cowpea roots alone 100 per

cent. As it takes two years to grow a crop of red clover suitable to plow under, while two crops of cowpeas can be grown in one, the great value of this plant as a fertilizing crop is apparent.

COWPEA HAY.

The only drawback to the use of cowpea hay as fodder, has been the difficulty found in curing it without having it heat and mold. If thoroughly sun dried, the stems are hardened, and the mature pods are broken off and lost. Dews also damage the hay, and the leaves, the most important part of the plant excepting the peas, drop off.

To overcome these difficulties, Professor R. L. Bennett, of the Agricultural Experiment Station, at Fayetteville, Ark., has devised a "stack-frame for curing and storing cowpea hay." By the courtesy of Professor Bennett we are allowed to present here the cut which he had made of this device and to give the following abridged description:

The plan of construction is a series of open shelves arranged one above the other. The shelves are made of fence rails placed 12 inches apart, their ends resting on horizontal supports. The supports are nailed 2 feet apart to upright posts put with one end securely in the ground. Strips 1x4, with one end resting on the ground, are nailed diagonally to the horizontal supports for braces. They are essential to prevent the frame from inclining, and for supporting and holding in place the ends of the horizontal pieces.

The length of the stack-frame can be increased indefinitely by erecting frames similar to the one shown, in the front end of the stack, distant from each other the length of a fence rail, or whatever is used. These cross frames can

be made on the ground and then set in place. The sides of the stack must be perpendicular, since pea vines will not turn water. To give the top the proper pitch to turn water, the top shelf is made narrower than the shelf below by leaving out the side rails, as shown in the cut. Sufficient straw or grass hay should be used for covering, and it must be made



STACK-FRAME.

to project over the edges of the first wide shelf so as to turn all the water off the sides of the frame. The dimensions used were as follows: width, 10 feet (made so because the planks used were already cut that length); length, three fence rails, each fence rail 11 feet. Shelves or floors 2 feet apart. Rails placed 12 inches apart on the horizontal supports. Capacity 4 tons dry hay; 5 tons if covered with tarpaulin.

STACKING THE HAY.

The first floor of rails is put about 12 inches apart on the horizontal supports and one man unloads the hay from the wagon while another places it. When hay has been put evenly on until it is a few inches above the place for the next floor, the second set of rails is put in place. They press down the hay, but as it dries it settles, leaving a space. This process is repeated until all the floors are laid and filled, and the hay covering, or tarpaulin or boards, are in place on the top.

Small poles, taking up less space, and longer ones, can be used and the number of cross frames lessened.

When feeding, remove the hay first from the lower floors, leaving the top covering in place until the last. Beginning on one side of one section the hay can be drawn out of the sides of the two lower floors and the rails or poles removed from these floors as they come in the way, and so on with the other floors to the top.

If tarpaulin cover is used, a ton or more of the grass hay for topping out can be saved, and this will more than pay the cost of the cloth covers the first year. A permanent roof of boards can be used; and in that case, instead of using the diagonal braces, posts similar to the middle one can be used and the ends of the horizontal supports nailed to them. The middle posts can then be taller to support the comb of the roof, while the eaves would be supported by the outside posts.

Professor Bennett, in the bulletin referred to, adds the following points and suggestions, which are valuable:

"The vines should be stacked as soon as wilted; if cut in the morning and exposed to the sunlight they can be

stacked that evening. By stacking the vines when wilted no loss whatever occurs and the best possible hay is made.

"A very important advantage can be gained by the use of the frame in that hay can be made independently of the weather. It would be advisable to have such a stack-frame on every farm where other hay is made, for in the event of rainy weather at hay making the hay could be cured and saved notwithstanding the unfavorable weather.

"Cowpea hay is bulky and much barn room can be saved by curing and storing in the frame or by curing in the frame then baling the hay or stacking it around a pole.

"By having the pea crop ready to cut at different dates and by the use of the stack-frame, pea hay could be grown extensively and baled for a market crop.

"The frame possesses advantages of requiring a small amount of inexpensive material to build it, is easy to erect, is durable, can be easily moved from place to place without tearing the cross frames to pieces and hay is easily stacked and as easily removed from the stack.

"As is well known there is great difference in the appearance of cowpea hay cured in the sun and that cured in the shade; stock also prefer that cured in the shade. To learn if there was any loss or difference in the two hays differently cured, two samples of hay, one cured in the sun and the other in the shade, were furnished the station chemist for analysis. The analysis was made, but it revealed no practical difference in the two samples. When pea hay is cured in the sun the long exposure to sunlight and dews hardens the stems and the palatability of the hay is doubtless impaired."

As food for stock, the value of cowpea hay should be better known than it is. Professor Tracy, in one of his bul-

letins, has well said that "it will make more food in a shorter time than any other crop known to the Southern farmer. I believe the average farmer does not appreciate the cowpea because it is so easily and cheaply grown. He is inclined to think something else brought from a distance better. Certainly, when it is remembered that each acre of peas brings to the soil from the air \$9.60 worth of fertilizer, equal to an application of 1,000 pounds cotton seed meal, we will more justly value this easily and cheaply grown crop. Even when we cut the crop off for food the roots and stubble still contain large amounts of nitrogen taken from the air, and the manure made from feeding the crop is worth nearly as much for fertilizing as the crop itself."

Cowpeas can be planted from April to August, on any kind of land—wet or dry, rich or poor, with almost a certainty of getting a crop. The different varieties mature all the way from two and a half months to six months from time of planting.

CRAB GRASS AND COWPEAS GROWN TOGETHER

Furnish the very best hay crop. The Southern farmer often works exceedingly hard to keep down crab grass in his fields, and doubtless when this grass is among his cotton or corn, he does well to do so; but if he will handle it aright, crab grass is one of his best friends. To the farmer who has been fighting it all his life, this will seem a wild assertion, but it is nevertheless strictly true. Supposing the farmer has a field from which he has just harvested a crop of early Irish potatoes, and having several head of cattle and horses, wishes to provide for them a good supply of fodder.

Let him run his harrow over the field to level it nicely, and sow it to cowpeas, in drills 2 feet apart, thickly in the rows, working the peas when they are well started, once, then let the crab grass fight for the ground with the peas.

This is all the culture necessary, the peas and crab grass growing thick together on almost any kind of soil, and forming a dense mat of vegetable growth, about 2 feet high. Both are benefited by the mixture of the two kinds of growth; the crab grass grows taller and is more easily mowed when growing among the peas, and on the other hand the cowpea hay is much more easily cured when grown with the crab grass, than when grown by itself. There is one other point to be noted, and that is that all kinds of stock relish this combined hay, cowpea and crab grass, better than almost any other kind of feed, turning away from the best of clover and Timothy to eat this, and it keeps stock in excellent condition. From 3 to 4 tons of excellent hay can be raised in this manner at a cutting, per acre on good ground, and if not planted to potatoes first, two crops of hay can be secured from the same ground.

MILLET.

This plant is growing in favor at the South, and for a quickly grown and easily harvested crop, for a soiling (green fed) crop, or for winter fodder, it is of special value.

It can be put in late in the spring, where the seasons are favorable, following some winter crop, such as winter rye or an early spring crop, such as Irish potatoes, and will be ready to cut in from sixty to seventy-five days. It should be cut as soon as the heads are well formed if wanted for feeding purposes, but if for seed, of course it must remain

until fully formed and should then be bound in bundles the same as oats or wheat, thus preventing waste of seed in handling. Where millet is grown for the seed the value of the hay is greatly diminished, as the stalk becomes woody and hard when fully ripe.

The German millet is the variety mostly grown at the South, although the Hungarian finds some favor. The German is a leafy variety furnishing a heavy growth of fodder, and if cut and cured before the seeds are formed and ripe, no ill effects will be found in feeding to horses or cattle. We should not advise to feed millet alone, but in alternation with other good grass hay, chopped oats straw and a little bran it is a fine nutritious food.

Millet may be sown broadcast or in drills and from 25 to 30 pounds of seed are required per acre, costing from 3 to 10 cents per pound according to quantity purchased.

RED CLOVER.

This plant succeeds well wherever it is tried on clay or loam soils at the South. It does not succeed here well on poor sandy soils, and on such soils cowpeas are a preferable crop. It may take a little more care and thought to prepare the ground properly and sow at the right time, than to plow and plant for a corn crop, but the intelligent farmer will find no difficulty in growing at the South just as good clover for pasturage or mowing as can be grown at the North, and while we cannot say we think it as valuable as a Southern fodder plant used as hay as alfalfa, yet in furnishing pasturage for cattle and hogs it is well worthy of cultivation. Alfalfa cannot be pastured, it will not bear being trampled on, while clover is of great value for pasture as well as for hay.

Besides this, the use of clover as a renovator of worn-out lands or to enrich those naturally poor, is too well known to call for more than brief mention. Clover is a good all-around fodder plant. It is excellent for pasturage, for hay, and for the land upon which it is grown, whether plowed under or not, the effect being greater of course where it is plowed under. The Southern cowpea, as we have already shown, will produce a crop ready for use as hay or as a fertilizer in one-third of the time required for a clover crop, but then it does not furnish a permanent pasture as we shall show presently, clover at the South, does. So take it all in all, clover should be grown all through the South wherever it is found to be a success.

The seed of clover is a valuable product, worth at retail from \$6 to \$7.50 per bushel; this is usually produced from the second cutting of the season, the first being used for hay only. From 2 to 3 bushels of seed per acre is an average yield. Ten to fifteen pounds of seed are sown per acre, costing from 10 to 15 cents per pound. In the South it is best to sow in a rainy time in the fall or in the winter, although good results are obtained from early spring sowings if the season is tolerably wet.

Let the ground be thoroughly and deeply broken, and pulverized by harrowing, then sow the seed broadcast and harrow in with a light harrow, or run a roller over it. In the North it is often sown with some other crop, such as oats, rye, or wheat; but in the South this is not advisable. A good stand can almost invariably be secured by sowing without a nursing crop on well worked land in the fall or winter, and as we have said under the head of Bermuda grass, clover is found to succeed admirably when sown on Bermuda sod, and

thus to furnish a permanent pasture. *Not that the clover is perennial, but that it reseeds itself, and that just at the time it is shedding its seed the Bermuda dying down in December, January and February, furnishes an excellent seedbed for it to start in. When grown by itself alone and plowed under, clover puts the land in splendid condition for wheat, corn, Irish or sweet potatoes, or almost any other crop, and is a superb fertilizing plant to sow in bearing orchards.

Clover does more than merely to sustain the fertility of the soil, it increases it, drawing upon the atmosphere for the nitrogen almost all other plants derive from the soil. The long tap roots of the clover and lucerne family have also a mechanical effect on the soil as they bore down into it, and bring to the surface the plant food, leaving when they die and decay, vertical drainage shafts, which carry off superfluous water.

ALSIKE CLOVER.

This plant is of European origin, but seems to be well suited to all parts of the United States where it has been tried, and valuable at the South. It is perennial, or if not perennial it reseeds itself so vigorously that it retains its hold of the soil, and so is virtually perennial.

It thrives even in dry, hot seasons, and can be sown thin as it throws out several stalks from one root. It is considered one of the most vigorous and hardy of the clover family introduced into this country. The plant is full of leaves affording a large amount of nutritive fodder; the heads are small, numerous, round, and of a beautiful, delicate, crimson color.

*See article on Southern Grasses by M. B. Hillyard, in May, 1895, number Southern States Magazine, p. 98.

It seems to prefer damp, loamy soils, but even on dry upland clays, with good, thorough preparation of the ground, the soil being deeply plowed and well pulverized, it will do well. It can be sown either in the fall or early spring. The directions given for sowing red clover will apply equally well to alsike clover.

Alsike can be cut for hay the first season, just as soon as it is in full blossom. It cures easily and makes an excellent hay of heavy tonnage to the acre, but as the heads are liable to break off and waste if left to get too ripe, it is recommended to cut it a little before all the heads are ripe, and the handling of the hay to be done while it is in a moist condition; the same kind of stacking frame as is described herein on page 21 being recommended for curing it in that somewhat damp condition.

As to the value of alsike clover as a fertilizing plant, we have no information, but from the fact that it belongs to the clover family, which is known to be rich in nitrogen, potash and phosphorus, we feel warranted in expecting as good recuperative results from this as from the other members of the same family. Sow from 5 to 6 pounds of seed per acre, costing from 15 to 20 cents per pound, according to quantity bought.

We recommend the farmers of the South to sow a few acres and test it, it may prove more valuable than red clover or alfalfa on account of its being ready to cut the first season and also that it is perennial. Alsike clover is a superb honey plant, the bees are very fond of it. It makes an excellent pasture and bears cropping by cattle well.

Where it is intended to be cut for hay, the ground should not be left in ridges as plants of this family are liable

to lodge and prove hard to cut; work the ground level. It is a good plant to sow with red top and other grasses that thrive on damp lowlands.

CRIMSON CLOVER.

Crimson clover (*Trifolium incarnatum*) is another forage and pasture plant which is proving of great value at the South. It can either be sown in the late summer or fall, in which case it will mature by the last of April, or it can be sown in the early spring when it will be ready to cut in June or July.

It grows from 20 to 30 inches high, and as the roots have the penetrating habit of other clovers and the plant draws its nitrogen chiefly from the atmosphere, it is a superb fertilizer. It is eminently adapted to the South, loving a mild, humid climate, and while it does not thrive when fall sown at the North, it succeeds thus admirably on the loamy, friable, upland soils of the South.

It is unlike red, alsike or alfalfa clovers, in being an annual plant, but as it is easily grown, no trouble being found ordinarily in getting a good stand and yield, it has proven itself to be a very valuable fodder plant. It has strong upright stems, and long cone-shaped heads of a rich, beautiful crimson color. It will be found to produce a heavy amount of seed, but this will require prompt attention just as soon as it is ripe, as the seeds shed easily. It will also be found excellent in orchards, to be plowed under as a fertilizer, or to yield quickly as a catch crop a large amount of excellent forage or hay.

To show the high esteem in which crimson clover is held we quote from a lately issued agricultural publication as follows:

"Crimson clover has now been tested by thousands of farmers in all sections of the country, and has revolutionized methods of farming and brought under profitable culture thousands of acres of land which were heretofore too poor for tillage. It is purely an annual and must be sown every year. It will make a good growth on land that is too poor and sandy to grow red clover or any grasses at all, and will make an enormous growth on good land. It is valuable as a green manure crop, because it can be grown during the winter and turned under in the spring in time to plant corn or other crops.

"Being strictly a supplementary and extra or 'stolen' crop, no other crop need be omitted to grow it; it grows quickly, and adds fertility to the soil beyond the ability of any other known plant in so short a time. It will improve worn-out and poor soils more rapidly and permanently than any other plant in existence. It is therefore the cheapest and best fertilizer, also the cheapest food for all kinds of stock. Stock like it; will leave their grain and feed for it. It grows and matures its crop when other crops are dormant, furnishing the very best of feed and still permanently improving the soil. * * * It will produce on ordinary soil 8 to 10 tons of green food per acre, 1½ to 2½ tons of hay per acre; plowed under as a manurial crop it is worth as a fertilizer \$24 per acre. Experiments at Experimental Stations have also shown that \$1 invested in seed per acre added 24 bushels of corn. It can be sown in fields of growing corn; in open ground after some other crop is harvested, or in apple, peach, pear, plum or cherry orchards."

The growth is so heavy as to entirely choke out a nurse crop. It is best sown by itself, whether sown in fall or spring.

When sown in the fall (ripening in the early spring) the weather is sometimes unfavorable for curing the hay, and doubtless the Fayetteville Agricultural Experiment Station stacking frame as described on page 21, or some modification of it, will be found useful for this crop, or it can be cut as wanted and fed green, or pastured. It is a valuable acquisition at the South, and a field of crimson clover in full bloom, the brilliant crimson heads surmounting the pale green foliage, is one of the most beautiful sights imaginable. It is a sure crop, easily raised on light loamy soils; stiff clays or sands not being as well adapted to it; and produces a very heavy, dense growth of excellent forage. Sow from 10 to 12 pounds per acre, cost 10 to 15 cents per pound.

JAPAN CLOVER.

The fact that this little foreign plant has established itself, and as it were adopted the South as its home, is one evidence of its value. It has traveled self-sown along the roads, from field to field, and from State to State, until it is at home in nearly every part of the South.

While it is a fine pasture plant, it is also very valuable as a fertilizer; it creeps over the poor clay hills; dry weather cannot kill it; its roots go down deep; the cattle feed eagerly upon it, and at last when frost comes it dies down and enriches the soil. We do not think it has been *sown* to any great extent at the South, but it ought to be. It should be given a chance upon well plowed land just as other forage plants, are and without doubt will be found just as valuable as some of the best.

Director Bennett writes of it as follows:

"JAPAN CLOVER (*Lespedeza striata*). This plant is an annual and has, from an introduction into South Carolina from Japan, spread all over the South. It makes a better growth than any other plant on poor, barren, clay soils. Its hay is highly nutritious and when sown on good soil, especially bottom soil, it grows from 20 to 30 inches high. Its greatest value is for pastures on poor soils and for fertilizing such soils. It quickly takes possession of uncultivated fields and holds them from washing, and protects them from the hot sun. The plant prefers clay to sandy soil. It furnishes grazing from middle of May until frost kills it down. Seed are sown in early spring at the rate of 15 pounds per acre."

Japan clover seed can be obtained of the Philadelphia or other seedsmen (see advertisements in this book), costing at present (1896) 35 to 45 cents per pound.

RED TOP.

Red top, or Herd's grass, as it is sometimes called, is a fine pasture and hay grass at the South, on moist land. It thrives in fact upon land too wet for any other grass, and should not be sown upon dry uplands. It is not a perennial grass like the Bermuda, but if allowed to mature its seed will die out in a few years. The Southern farmer will doubtless find that for an all round pasture grass, suited to nearly all places, soils and conditions, Bermuda is the more profitable grass, still red top does as well here as at the North, and in fact much better than it does in the arid Northwest, where it can only be grown on irrigated land, or on some special piece, made moist by springs. From 24 to 36 pounds of seed are used per acre costing from 7 to 15 cents per pound,

and here again Bermuda has the advantage as it costs nothing for seed. When sown with a nurse crop such as oats or barley (a practice not to be recommended at the South) about half the quantity of seed is used. Red Top furnishes good hay or pasture, but as we have said should be fed close or cut before the seed matures, or it will soon die out.

SORGHUM FODDER.

Sorghum raised exclusively as a fodder crop can hardly be outclassed by any other plant; yielding as it does 8 to 9 tons to the acre of the best of sweet nourishing fodder, 4 to 5 tons the first crop or cutting, and a like amount the second. These cuttings should both be made before the cane gets hard and woody. Sorghum is a much better fodder plant than corn, as it yields two crops or cuttings, corn only one. It produces double as much forage, and is more easily cured than corn grown for fodder purposes. Amber cane is the best variety for fodder and should be sown early in May, or as soon as all danger from frost is gone. Plow and work the ground well and sow 1 bushel of seed broadcast or in drills per acre, and cut as soon as the heads begin to form; the first cutting being in July, when the fodder should at once be removed from the field, giving the second crop a chance to grow from the suckers, but the cut fodder must be thoroughly dried before it is stacked or put under cover, or it will heat and spoil. On fair land it will grow 6 or 7 feet tall, and on rich land twice or three times that height. It furnishes a most excellent feed for cows, and increases both the flow and quality of milk. Sorghum grows rapidly after it once gets a start, chokes out weeds, puts the ground in excellent condition for the next season's crops and flourishes

on land that is too wet for anything else excepting red top. It thrives on a rich, mucky soil, although it does well on any land that will bring a good crop of corn. It is not well to let cattle eat too freely of sorghum fodder in a green state, as it is liable to cause bloat or colic. On another page we have given some items on sorghum as a sugar and syrup plant. Sorghum is a very exhausting crop, and should only be grown on good strong land, which should afterwards be given rest, or should be recuperated by the use of cowpeas, crimson clover or other fertilizing plant plowed under, or enriched with stable manure.

WINTER PASTURAGE.

The Northern farmer has little use for winter pastures, as snows would cover them up for months, and when the snows melt, the ground is too wet to let the stock out on it. Stock of all kinds must be penned up and fed for half of the year; but in the South, green winter forage can be successfully grown and pastured. Cattle men should note this great advantage and secure stock ranches here in the South, where stock can be handled and fed in winter so much more economically than at the North, and their profits correspondingly increased.

THE BLUE GRASS FAMILY.

The different members of the blue grass family are all of them useful as affording winter pasturage. Kentucky blue grass (*Poa pratensis*) is said to have been brought originally from England to Kentucky* "by a family which accompanied Daniel Boone to Boonesborough, in the first

* U. S. Agri. Rep. 1854, p. 190.

settlement of Kentucky, and planted it in a garden at that place. It became troublesome and was dug up and thrown over the fence. But it could not be so easily rooted out, and in time spread over the State. It is the 'spear-grass' of England."

This may be the true origin of the blue grass of Kentucky, still it is a well known fact that in Illinois, wherever wild prairie lands were fenced up and cattle pastured upon the native herbage all other grasses and plants died out, and in a few years these unbroken lands, that a plowshare had never touched, were found to be thickly covered with blue grass. So we conclude it may have been there an indigenous grass, that took the ground and pushed out all other growths as soon as the annual fires that used to sweep over the prairies, were stopped.

This grass succeeds at the South wherever the soil is naturally rich in lime or is made so by the application of this article. It is well to give the ground you intend to sow to blue grass a light top dressing of *thoroughly slackened* lime the season before. A good blue grass pasture can be had in an upland wood lot by cutting out half of the timber, grubbing and burning the brush, giving the ground a light plowing and a top dressing of lime as above, and sowing it to blue grass in the winter, or not later than the 1st of March.

Blue grass furnishes an excellent winter and spring pasture. It is green all winter and as it is perennial, it is good for a lifetime, but should receive a top dressing of manure every fifth year. There is a variety of this plant known as Texas blue grass (*Poa arachnifera*) which is said to be well suited to a dry climate, but we are not sufficiently well posted to speak of its value. In nearly all parts of the

South there is ample rainfall to secure a good growth of the Kentucky blue grass, the conditions of soil being favorable. It is used almost exclusively as a pasture grass, and is not cut for hay. Its growth should be encouraged all through the South, as when once established no grass is better as an all-the-year-round pasture grass; stock are very fond of it, and close pasturing only seems to make it grow stronger and better.

The seed weighs 14 pounds to the bushel, and costs from 12 to 20 cents per pound according to quantity bought. Twenty to twenty-five pounds of seed per acre are sufficient to sow for pasturage, or double that amount for a lawn. A lately published agricultural magazine has the following:

"In limestone districts the main pasture should, in the Middle States, be the Kentucky blue grass (*Poa pratensis*), with orchard grass in beginning. On clay uplands of the granitic formations or on the red sandstone formations in the Middle States use Virginia blue grass (*Poa compressa*) and Rhode Island bent grass, with orchard grass to start the sod and protect the slower grasses. The same rule will apply to the mountain regions of Virginia, North Carolina, South Carolina and Georgia. For the Southern coast plain there is no grass which can equal the Bermuda grass. This, mixed with Texas blue grass (*Poa arachnifera*), will make a perfect summer pasture from North Carolina to the Gulf of Mexico."

ORCHARD GRASS.

Is an excellent grass at the South, and although it does not keep green all winter, yet as it lasts so very late, and starts again so very early in the spring, it may practically be said to be a winter grass. It succeeds on any toler-

ably good soil not too wet, and while its name would suggest that a shady place, like an orchard is especially desirable for it, it is not found to succeed where the shade is dense. It forms a permanent pasture or meadow on soils suited to it, such as our loamy uplands and valleys, and on good soils grows from 2 to $2\frac{1}{2}$ feet high, and although it has a tendency to grow in tufts and bunches, this can be overcome by thick sowing.

This grass may be sown with blue grass or red clover as a combined crop, with the latter especially, as clover thus sown reseeds and renews itself or it can be re-sown broadcast on the orchard grass late in the winter, and harrowed in.

Orchard grass should be sown at the South in the late fall or early spring and from 20 to 25 pounds of seed are required per acre, costing from 15 to 20 cents per pound.

This plant furnishes good hay and can be cut twice in the season, or cut once and pastured the rest of the year. It is undoubtedly a better hay plant for the South than timothy, giving a heavier yield of hay and better pasturage.

When grown for hay it should be cut when it is in bloom, before the stalk has become at all dry and woody, as it soon becomes unpalatable to stock if allowed to get too ripe. This is a strong growing, vigorous grass, makes a good permanent pasture, stands dry weather well, and should be given a trial by our progressive farmers, especially as a combined crop with red clover is mentioned above.

LIME ON GRASS LANDS.

In regard to the use of lime on grass lands, not only when sown to blue grass but to the other cultivated varieties, we quote a short article written by Professor C. O. Flagg, director Rhode Island Experiment Station, as follows:

"THE SECRET OF A GOOD CATCH OF GRASS SEED ON LIGHT SOILS.

"From numerous complaints about poor grass crops on light soils, even when well manured and with a fair amount of moisture, it seems to me that the trouble in many cases is due to failure in getting a good catch of grass seed. Now here, on the Experiment Station farm, we have been contending with just that difficulty for several years. Our plain land is sandy loam underlaid by a stratum of yellow loam 2 or 3 feet in thickness, which in turn is underlaid by porous gravel of unknown depth, the permanent water table being about 18 feet below the surface. This land was in a thoroughly exhausted condition when purchased for experimental station use. Liberal amounts of chemicals and fertilizers, ordinarily purchased as sources of plant food, have been used experimentally on portions of this plain, but without success so far as the securing of a stand of grass or clover was concerned.

"Not until an application of air-slacked lime was made has success been attained, and repeated experiment has shown that the presence or absence of air-slacked lime accounts for the success or failure on this particular farm. There appears to be, and repeated experiment has pretty well demonstrated the fact, an acid condition of the soil sufficient to prevent the growth of our ordinary grasses and clover in their infancy. Seeds germinate well, but after de-

veloping two or three leaves, the plants turn yellow and soon die. Where the fields have been treated to an application of from 1 to 3 tons per acre of common air-slacked lime thoroughly worked into freshly plowed fields before seeding, clover and Herd's grass present an entirely different appearance. The young plants are of a dark green color and vigorous growth, and this season we have had heavy crops from both Herd's grass and clover seeding. By the liberal use of unleached wood ashes the same purpose may be accomplished, as wood ashes contain a large per cent of carbonate of lime, but if, as I suspect in many instances, the beneficial effect of wood ashes is due to the carbonate of lime rather than to the potash in promoting the growth of clover, one can accomplish the same results more economically by purchasing and applying air-slacked lime. The effect of lime may be twofold: (1) As a chemical agent in correcting any excessive acid condition of the soil; (2) a mechanical effect by flocculating the finer particles of the soil, making it more retentive of moisture.

* * * * *

"My observation of the sandy soils of the South, especially of the Atlantic States, suggests that lime, plaster (gypsum), or clay, one or all, may at times prove useful as fertilizers or aids.

* * * * *

"Of course lime of itself is not sufficient to produce good crops, a sufficient amount of potash, phosphoric acid and nitrogen should be added to produce an average crop of hay."

WINTER RYE.

We doubt if there is any one crop that gives young colts, brood mares, cows, calves and sheep more joy than a winter rye pasture in the months of January and February at the South, coming as it does when almost every other species of green forage plant is in its worst form. To be able just then to turn such stock in on a green succulent pasture is no less a joy to the animals, than it is profitable to the farmer. Rye will thrive on almost any kind of soil, rich or poor, and if plowed under after it has been pastured, is of considerable advantage to the land, as a fertilizer. Sow in the autumn, after other crops, such as cowpeas, cotton, sweet potatoes or corn, are harvested, as early as you can after the fall rains have commenced, and the ground is moist. From one and a half bushels, where sown with a drill, to two and a half where sown by hand, is required, the seed costing about one dollar per bushel. Put sheep and young calves on it in the late fall as soon as a good stand is secured, thus preventing "jointing" until the spring. After this, turn in brood mares, and colts, young cattle, etc., and lastly the pigs can come in for their share. It must not be pastured too late in the season however, if it is to be cut as a grain or hay crop. The proper date to cease pasturing will of course depend somewhat upon season, soil, etc., but as a general thing all stock should be taken off from it in the South by the last of March, if it is to be cut for this purpose, but if it is to be turned under as a green manure it may be pastured somewhat later. By the time it gets to heading, stock lose their relish for it.

ARTICHOKE FOR HOGS, SHEEP, ETC.

This plant, commonly known as the Jerusalem artichoke (*Helianthus tuberosus*), is one of the easiest fodder plants to raise, yields immensely, and does excellently in the South. From 600 to 800 bushels are produced on good land per acre, and even crops of 1,000 to 1,500 bushels are quoted. Hogs and sheep are very fond of this food, the former digging them themselves.

This plant should not be confounded with the garden artichoke, (*Cynara scolymus*), which has no tuberous root, and is of no known value to the farmer.

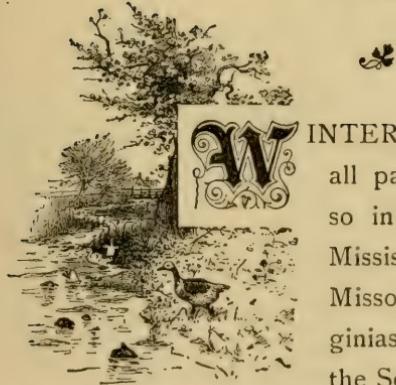
The Jerusalem artichoke is grown from root sets, the same as potatoes. Plant in rows 4 feet apart running north and south and set from 2 to 3 feet apart in the rows; 6 to 8 bushels plant an acre, and cost from \$1 to \$1.50 at the seed stores. They will grow on almost any kind of soil but of course do better on good, rich land. The stalks also, if cut and cured before frost, make excellent and ample fodder, and all kinds of stock—horses, mules, cattle, sheep and hogs are very fond of it. They should be cultivated the same as corn or potatoes. Artichokes are a good crop for orchard growth, if not placed too close to the trees. Pigs can be turned in when the crop is ripe and will cultivate the ground thoroughly while finding the tubers. At the end of the year, put on a top dressing of manure, harrow down smooth and the small roots left in the ground are ample seed for the next year's crop. Hogs thrive on this food, and it is estimated that an acre of artichokes, grown on good land, and where both the roots and stalks are utilized, is worth from \$300 to \$500 to the farmer.



PART II.

* Cereals. *

WHEAT.



INTER wheat thrives well in almost all parts of the South, especially so in Texas, Alabama, parts of Mississippi, Tennessee, Georgia, Missouri, Arkansas and the Virginias. In many other parts of the Southern country it will doubtless, upon trial, be found to succeed, but cotton has for so many years pushed it out of the way, that it has erroneously been set down as not adapted for Southern soils and climate. Until man finds some breadstuff better than wheat flour, this grain will doubtless continue to be a favorite and under propitious circumstances a profitable crop.

Land planted in the middle South to Irish potatoes in February, crop harvested in May, then sown to cowpeas, and this crop ripe in August—(whether the cowpeas are then plowed under or harvested for hay, and of course with

ordinary uplands the former is the preferable course) the Southern farmer has his land in prime condition for plowing for the sowing of wheat in September.

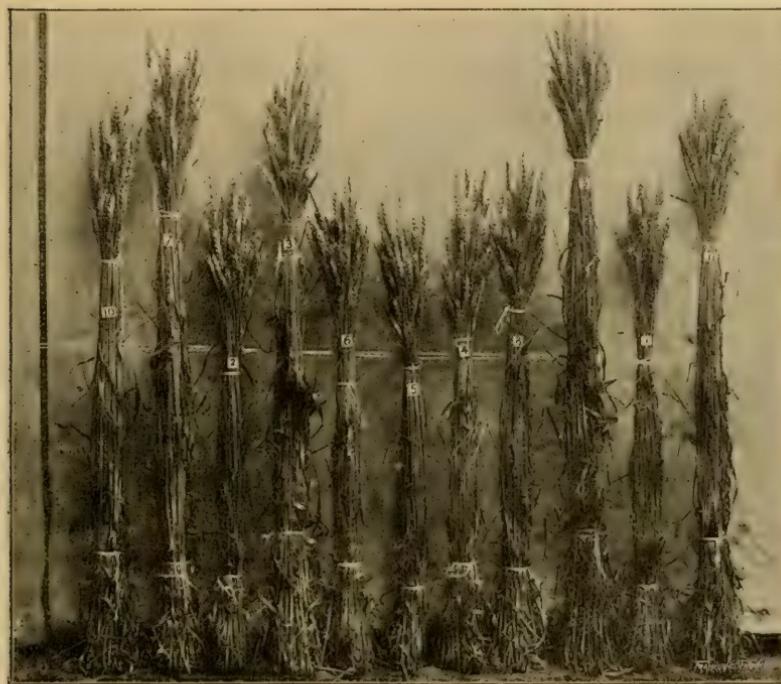
In any case let the plowing be deep and thorough, the ground well harrowed and the seed if possible drilled in; but if sown broadcast let the harrow follow the sower and if the season be dry run over the ground, after seeding and harrowing, with a light roller. This will almost invariably secure the germination of the seed, and a good stand. It has been found by experiment that 3 inches is the proper depth; better than either 2 or 4 inches.

The application of lime at the rate of from 5 to 10 barrels per acre, letting it first become air slacked, will be found to have an excellent effect on stiff clay soils, rendering them remarkably friable and porous, and is to be recommended in fact on all soils deficient in lime, upon which wheat is to be sown. In some parts of Pennsylvania as much as from 75 to 100 bushels of lime are applied per acre to wheat lands. The judicious use of lime has been found to largely increase the yield of wheat on most soils, even on sandy soils. While the price of wheat remains as low as it is at present it is not likely to be largely grown at the South, but with an increased demand and a better price, Southern farmers will surely turn their attention to this crop. And if it can be shown that with proper culture it will then pay to sow wheat at the South, a great point will have been gained. We believe the South both can and should profitably produce its own breadstuffs, and that then fine, well equipped flour mills would pay as well here as in any other part of the country. We trust this is not a wild and visionary statement.

Let us see what has been done on some of our poorer soils, and from this we can judge what can be done on good land.

COWPEAS AS A MANURIAL CROP FOR WHEAT.

The value of the cowpea turned under as a fertilizer on wheat lands has been a matter of experiment at our Agri-



cultural Experiment Stations, and the results have been so marked and valuable we reproduce one of them here, namely that of the Fayetteville, (Ark.), Station, on nine plots of wheat grown the season of 1893-94, on worn, sandy cotton lands, at the sub-station near Newport, Ark.

The engraving above, which was kindly loaned us by Professor Bennett, shows 100 heads of average wheat taken

from each of the nine plots. The table of yields, etc., is taken from the station bulletin.

A crop of cowpeas plowed under is shown by this table to have raised the yield from 5 bushels, to 16 bushels 53 pounds, and in another case from 5 bushels to 18 bushels 10½ pounds.

MANURE EXPERIMENTS WITH WHEAT ON SANDY SOIL.

The number of each sample in the cut is the number of the plot upon which the sample grew.

TABLE OF YIELDS, 1893-94.

Plot No.	Method of Treatment.	Yield in Bushels per Acre.
<i>Wheat Grew on Plots 1 to 7, 1892-93.</i>		
1	Wheat following wheat to ascertain the residual effect of 40 bu. cotton seed applied per acre, 1892-93.....	5 bu. 46 lbs.
2	Nothing	5 bu.
3	10 wagon loads horse manure per acre.....	15 bu. 16½ lbs.
4	150 lbs. acid phosphate.....	6 bu. 28½ lbs.
5	150 lbs. kainit.....	6 bu. 9½ lbs.
6	200 lbs. gypsum	7 bu. 53 lbs.
7	Peas planted July 31, turned under green Oct. 10.....	16 bu. 53 lbs.
<i>Wheat on Plots 8 to 11, 1891-92, Cowpeas Spring 1893.</i>		
8	Pea roots	10 bu. 28 lbs.
9	Pea vines with pods on vines.....	18 bu. 10½ lbs.
10	Pea vines with pods off vines.....	15 bu. 30½ lbs.
11	Green pea vines with pods on vines—turned under green July 31	14 bu. 32 lbs.

The Experiment Station bulletin says in regard to these tests:

"Wheat on all pea plots and on stable manure plots, tilled more than the commercial fertilizer plots and other plots. The increased yield in grain is due mainly to that, and not to any increased length of heads. The pea and

stable manured plots appeared to have tillered more than twice as much as the others did."

It is worthy of note that on plot No. 8 the *pea roots alone* (the stubble, after pea vines and peas had all been removed) increased the yield 100 per cent, while on plot 10 the pea vines, with pods picked off the vines, increased the yield over 200 per cent. The possibilities of wheat culture at the South stand out strongly in the light of these experiments. A good rotation of crops might be outlined as follows:

First, land well broken and planted to Irish potatoes in February; these dug middle of May and followed by a crop of cowpeas, plowed under in August or September. The land then sowed to wheat, and when this is ripe the next spring, plant again to cowpeas. Mow these for hay and either sow again to wheat or seed to crimson clover. Combinations and rotations of crops similar to these will readily suggest themselves to our readers. The main point to be observed is to precede wheat with cowpeas, clover, or some other crop rich in nitrogen, which is plowed under, and so the fertility of the soil is maintained and in fact augmented.

It is found that where cowpea vines are plowed under as a fertilizer, either for wheat or other crops, by far the preferable plan is to let them get *thoroughly ripe*, then cut them and, if you have time, let them lie a few weeks on the ground, then plow them under.

Green vines plowed under set up too great a fermentation, and a good part of the nitrogen in the form of ammonia is passed off into the air or leached out and lost before the constituent parts of the vines are so decomposed as to be ready to be taken up by the crop you desire to benefit.

Bulletin No. 26, of the Georgia Experiment Station says in regard to the manurial value of cowpeas:

"Mowing the vines and permitting them to lie on the surface and plowing under in November, was decidedly better than turning the vines under in August. Turning the vines under green gave the poorest economical results."

The bulletin prefaces this by saying :

"The best disposition of a crop of cowpeas is to convert the vines into hay or ensilage. The next best, is to permit the peas to ripen and gather (or pasture them)."

By this arrangement, it is of course understood that all the droppings from the stock eating this food, either as hay, ensilage, or in the pasture, are returned to the soil.

The bulletin referred to, says of the varieties of cowpeas to be planted:

"The earliest cowpea, and hence the variety best adapted to high latitudes, is the *new era*; this matures in a little more than sixty days from time of planting. Other very early varieties are *congo*, *white giant*, *chocolate* and *vacuum*.

"The heaviest yielder of vines is *red ripper*, followed by *forage* or *shinny*, *black* and *unknown*.

"The heaviest producers of peas are *unknown*, *calico*, *clay* and *white-brown-hull*.

"For hay, the erect varieties are preferable to those of a recumbent habit, since the mower cuts them all. The best of the erect varieties are the *unknown*, *clay* and *whippoorwill*.

"The best table peas are *sugar-crowder*, *white-crowder*, *mush*, *large* and *small lady*, and *rice*.

"The best stock pea for field grazing of either cattle or hogs is the *black*. It will remain in ground all winter without injury. *Everlasting, red* and *red ripper* are also good.

"For an '*all purpose*' pea, the *unknown* leads the list. *clay*, however, closely contests first place."

A FEW WORDS ABOUT DEEP OR SHALLOW PLOWING.

We deem it to be our duty to emphasize with all our strength the desirability of deep plowing, and so take it up here under a special head.

But right here comes an experienced farmer living in Maryland who writes as follows:

"A gentleman who moved into my neighborhood a number of years since, conceived the idea that he could render his land at once productive by simply plowing it *deep*; put four powerful horses to his plow, and turned it up to the depth of 12 inches; the result was a total failure; and after experimenting with it for a year or two, he endeavored to correct his mistake by turning it back again to the same depth, but in vain; the trifle of fertility that the surface possessed previous to the experiment had been buried too deep, and become incorporated with so large a mass of sterile clay as to render it inoperative. Neither will it, from my experience, answer to cross or stir the land, fallowed for wheat, more than from 3 to 4 inches; but let *that* be done thoroughly. I once almost entirely failed in making a crop by cross plowing a field as deep as it had been fallowed, and stirring until it was as light as it could well be made before sowing it down in wheat. The winter's frost or something else destroyed it, and instead of obtaining from 15 to 20

bushels per acre, which it was capable of producing, I reaped but little more than I had sown. This to me was doubly mortifying as a portion of it was sown with beautiful white flint wheat, procured from western New York, at an expense of \$3 a bushel by the time it reached me."

Having thus given the shallow plower full hearing, and there are doubtless many others whose observation and experience will parallel that of this gentleman, we may ask what was the trouble in the above recited cases.

First, as to the man who plowed his land 12 inches deep. What course should he have pursued? Evidently the first thing to have secured was an increased bulk of plant food, nitrogen, potash, phosphorus, lime and humus in the proportions the soil was deficient of these articles. These can all be secured by a few crops of cowpeas plowed under. Then when the soil is well replenished by this means, deep plowing will be just the thing needed, for let it be remembered the roots of cowpeas make the soil open and friable thus giving it a mechanical advantage as well as the chemical advantages the plant yields.

When it is remembered that the gain from crops of cowpeas cut at different stages of their growth, run as follows: Nitrogen, 48.4 to 61.7 pounds per acre; phosphoric acid, 7.9 to 13.0 pounds per acre; potash, 3.1 to 42.1 pounds per acre, it will readily be seen how rich in plant food this source is. Added to this is the very valuable humus going into the soil from the decomposition of the leaves, stalks, pods, and roots of the plants.

The first thing to do we repeat, with poor land, is to enrich it. If you have, or will save and store up, manure, as advised in the article herein on manures, haul that out on

the land, not putting it on too thin ; an acre *well* manured is worth five sparsely manured, you will then have taken the first step, and following this up with cowpeas, crimson or red clover, the Southern farmer will soon find his land in excellent condition, and can plow 8, 10 or 12 inches deep, and raise 100 to 200, or even 300, per cent greater crops than the land has yielded "since the woods were burned."

The other man's land was not very rich in humus, we infer, and as the gentleman says nothing about rolling the land after seeding, we conclude he did not use a roller, and the soil being so very finely pulverized, the wheat, if it started at all, burnt out. He probably got no stand. If his land had been richer, by the application of either animal or vegetable manures, it would have held moisture better and a better stand, growth, tillering and yield would have been secured.

CORN.

This grain succeeds well in nearly all parts of the South. The crop of 1889 as approximately given by the late census, being :

Tennessee.....	80,000,000	bushels.
Kentucky	68,000,000	"
Texas.....	60,000,000	"
Georgia.....	30,000,000	"
North Carolina	36,000,000	"
Arkansas.....	42,000,000	"
Mississippi	25,000,000	"
South Carolina.....	18,000,000	"
Louisiana	15,000,000	"
Virginia.....	27,000,000	"
Alabama	30,073,036	"
Maryland	13,770,417	"
West Virginia.....	13,730,506	"

The methods of planting and working corn at the South are substantially the same as in other parts of the country.

One point alone needs to be emphasized, and that is, that here but from one to two stalks should be grown in a hill, one being the preferable number. Better results (more corn to the acre) can be obtained in the South by allowing but one or at the utmost two stalks to grow in a hill than with more, and this is true even where the ground is naturally of the very richest character, or has been made rich by the use of manures. As thick a stand as is grown at the North will not succeed here. We cannot explain this; we only state it as a well ascertained fact, substantiated by the observation and experience of all. Thick planting of corn at the South means no crop at all, or a very meagre one.

Many prefer to plant in drills, and this doubtless is a good plan, although it may take a little more hand work than if it were in hills. By this plan the drills should be 4 feet apart, and the corn chopped or pulled out to stand 2 to $2\frac{1}{2}$ feet apart in the rows. Nowhere does this crop respond more readily to the generous use of manures than at the South, and here severe droughts are rarely experienced, and a crop, especially if planted early, is with good working almost a sure one.

The one fundamental error the Southern farmer makes, is that often he does not break his ground deep enough before planting (see article on page 49). Plow deep and work shallow should be the motto of the farmer who would raise a good crop of corn; and in fact this mode of culture is recommended for all kinds of worked crops, unless it may be cabbages, ground for which should be both broken and worked deeply. Another error resulting in many a poor field of corn is the almost universal practice at the South of

planting the same ground in cotton or corn for a long succession of years, without other rotation of crops.

A much better plan, that would not be found to exhaust the soil, would be a rotation of crops about like that recommended for wheat, say to plant the field the third year to Irish potatoes in February, and follow this with a crop of cowpeas in early part of June when the potatoes would be ripe and harvested. The peas, if the land is at all poor, should be plowed under in September and weeds and crab grass again plowed under at the first frost, and another crop of cowpeas put in in the spring followed by a crop of late Irish potatoes planted the first of August.

Then the next spring the land would be in good condition to be broken deeply and put into corn again, or into cotton, if the farmer prefers that crop.

The programme given can be varied by putting the land into red clover, or sowing to crimson clover, or millet. The point is, not to run it continually in corn or cotton or both, but to enrich the land occasionally with green crops plowed under, especially of the leguminous varieties, such as cowpeas or some plant of the clover family.

SELECTION AND CARE OF SEED CORN.

All experienced farmers are aware that the productiveness and early ripening of any kind of corn, depend very much on the manner of selecting the seed. Although other crops may be benefited by a change of seed, there is no need of changing seed corn, provided proper attention is given in selecting that used for planting. By giving the matter the attention it requires, a variety may be perfected so as to yield much more to the acre, and ripen at least ten

days earlier than at first. As soon as the earlier ears are thoroughly glazed, go over the field and select the seed from those stalks that are the largest and most thrifty, and that have two good ears. As soon as selected, braid and hang up in some dry, airy place where it can dry before cold weather. The reason we hear so much complaint of corn not coming up is generally this: the seed is selected from the crib where it was deposited in a wet state, and did not dry before frost came. It was frozen, and of course could not germinate. The farmer should never wait until the corn is in the crib or perhaps until he wants to plant, before selecting his seed, but should gather it in the field as it hangs upon the stalk, he can then see just which is earliest and best.

LEVEL CULTURE FOR CORN.

Plow well, at least 8 inches deep, and harrow thoroughly before planting. Mark both ways with shovel-plow, 5 feet one way, and 4 the other; wide way north and south when planting in hills. This lets in the sun. Some may prefer to put the hills nearer together, say 4 feet by 4 feet. Then plant in the furrows at the intersections of the markings. By planting in the furrows the corn will not need hilling. Leave the surface of your field level, that the roots may run deep into the earth, and the stalk will not break off when swayed back and forth by the wind. At the bottom of every stalk may be seen numerous brace roots, or feelers, which strike out into the earth to hold it fast. But, if the earth be cobbled up in hills, around the corn, it robs the fine fibrous roots of their proper nourishment, and the crop is injured thereby.

Dry weather has much less influence on a level surface, than if hilled. A level surface imbibes the rain uniformly,

diffuses it equally and secures it beneath the surface for the general benefit of that webwork of roots which fills the entire ground below. As soon as you can see the rows, start a horse and cultivator. This will keep down all weeds and is all that is necessary to produce a good crop; yet it may be well to go through once with a hoe.

UPLAND RICE.

We do not take up the subject of lowland or irrigated rice, because the area suited to the production of this grain is limited, while upland rice can be successfully and profitably grown all through the middle South. The average yield is greater than that of wheat, the price higher, and the labor in raising and harvesting no greater.

Upland rice is in every respect as good as lowland and sells for the same price. A 40-acre field yielding as an average crop 40 bushels per acre, if sold at \$1.25 per bushel would bring \$2,000, and the rice hay, for the plant is cut while the stalk is still green and makes excellent hay, would yield 60 tons, worth \$7 per ton or \$420, or a total of \$2,420 from 40 acres, besides the aftermath or second crop growth from the roots, which furnishes excellent pasturage until frost. Rice should be sown in April and is ripe and ready to mow in July. After it is cut, leave it on the ground until it is cured, then tie in bundles and stack for a few weeks until it goes through a sweat and whitens and hardens the grain.

The following article on Upland Rice Culture has been kindly prepared for us by Mr. J. H. Alexander, of Georgia, who has had a good deal of experience in growing this grain:

"The culture of rice upon uplands is growing in popular favor. Anyone who tries it upon a small scale at first,

finds the crop both reliable and productive. The value of it lies in the grain, which is staple, and always saleable, or if it is not convenient to clean and market the grain, the whole stalk cut, cured and fed to stock, constitutes one of the best forage crops to be had.

"Any good land that will make a bale of cotton, or 25 bushels of corn, will produce rice, whether it be light lands or clay. But a purely sandy soil would not be favorable to it. Any good loam or clay soil may be easily manured in the drill to produce rice profitably. The preparation of the land should be thorough. It must not be cloddy, or rough, or caked, for on such land it will be hard to get a good stand.

"The rows should be 2 to 3 feet apart. If the land is disposed to be weedy, grassy, or rough, take more room to allow thorough cultivation. In finely prepared, clean land 2 feet is enough to admit sufficient cultivation. The seed may be dropped ten or a dozen in a place every foot, or it may be lightly drilled. I prefer to drop it, as it admits easier cultivation. It is to be planted here in April, after all danger of frost is passed.

"The plant is small and tender in its earliest stage, and requires nice, careful attention until it gets started. Its growth then is vigorous. It wants to be plowed and hoed about as corn is cultivated. No grass must be allowed in the middles or in the rows. It needs to be kept very clean.

"If the conditions favor, the heads will be full and heavy. This crop is a very pretty one to see, very pleasing to the eye. The yield in grain appears to be about double what it would be in corn, on the same land. I think any land that will make 25 bushels of corn will make 50 bushels of rice.

"I have no machine to clean it, and have never tried to clean or sell the grain. I have used it all for forage. It is nutritious and healthful, greedily eaten, and if cured, or even wilted before feeding, I am sure there is no danger in it. Stock that is fed on rice needs no corn. I decidedly recommend the trial of it by every farmer. There is no need to venture much or take chances of loss. Try a half acre to start on and see what success you meet with. If your conditions suit it, enlarge the crop. Until you can afford a thresher to get out the grain, I suppose it would be best to sell it in the rough, for there is no domestic mill adapted to hull the grain. The rice planters along the coast, I think, usually sell it in the rough to the rice mills in the larger cities.

"I have found rice on my upland quite a pleasing addition to the list of forage crops, and will continue to use it for that purpose. I may add also that it is admirable poultry feed, very fattening and productive of eggs.

"I think seedsmen generally can furnish the seed. There is a small grain, known as Japan rice, and a larger, finer grain, known as Carolina white rice, either of which does well for the purpose I use it for. For market, as a staple crop, the latter would probably be preferable. Choice seed usually cost \$1.75 to \$2.25 per bushel. Eight to twelve quarts will plant an acre."

BARLEY.

Barley succeeds admirably on most of our Southern soils, in fact better than corn on some of our uplands, yet it has never become a popular crop here; in fact it has not been experimented with or had the attention paid to it which it deserves, this being probably due to the irritating spines

which the mature grain of the bearded variety, the kind usually grown, bears.

There is, however, a beardless variety known botanically as *Hordeum trifurcatum*, which might take the place of the bearded species.

In California, and in all Spanish countries and dependencies, as also in Germany, barley is one of the leading crops both for malting and as a stock food and breadstuff.

A strong, clay loam soil well drained, is best for barley; warm, generous land, not cold, damp or mucky.

A six-rowed *winter* variety is grown in some sections of the United States, and would doubtless succeed well in the South, the same as winter wheat does.

TIME OF SOWING—AMOUNT OF SEED.

The ordinary spring grown variety should be sown as early as the season will allow of adequate preparation. The crop stands about three months on the ground, and it is important that it gets a fair start before the hottest summer weather comes on. Few successful crops are sown later than April 1, and one advantage of fall plowing our corn stubbles is that it facilitates the early sowing of the barley crop following in rotation.

The amount of seed usually given to an acre, varies from 2 to $3\frac{1}{2}$ bushels; early sown and mellow soils requiring least. If drilled in also, a less quantity is required; and rolling when the young plants are a few inches in height, if the ground is dry and porous, is said to be serviceable in giving support to the roots, causing the plants to tiller and increasing their vigor. We question the utility of sowing over $2\frac{1}{2}$ bushels per acre, though some of the best crops

reported have received 3 and $3\frac{1}{2}$ bushels. Others, however, equally as good, have been produced from 2 bushels' seeding. On rich lands the tillering of the plants will be much heavier than on poor soil, and less seed will be required.

HARVESTING—VALUE OF THE STRAW.

In harvesting barley it is important to cut it at the right stage, when neither too green nor too ripe. If rather green the grain shrinks, and is of light weight—if fully ripe it shells easily and the straw is of less value. It is said that when the head begins to assume a reddish cast and drops down upon the straw, the proper period of harvesting has arrived—and, as after this the grain matures rapidly, it should at once be cared for. It may be mown or cradled, or cut with a reaper—if the straw is long it should be bound, though with proper forks for loading, it may be pitched from the swath without this additional labor. It need not stand long in the field, yet care should be taken that it is properly dry before storing in large mows, as it is more easily injured by heating than any other grain.

Barley straw, well cured, and not over ripe, is readily eaten by all kinds of stock. It is worth more for fodder than wheat straw, and is equal, perhaps, to corn stalks or inferior hay. The chaff is much liked notwithstanding the strong beards with which it is filled.

USES—STOCK FEED, ETC.

The greatest use made of barley is in the production of fermented liquors, but this grain affords an excellent feed for horses, and is equal to corn for fattening cattle and swine. For the latter purpose it should be cooked, or soaked in the

grain, or the meal may be wet and allowed to commence fermentation before using. This grain, when boiled, has long been employed in Europe as horse food, especially after a hard day's work or during illness. When fed to horses in a half malted state, it is said to be perfectly harmless, however heated they may be, or whatever quantity they may eat. To prepare it, soak it in water from twelve to twenty-four hours in the usual way.

OATS.

The oat is an excellent fodder plant at the South, growing as it does admirably from Virginia around to Texas and from Kentucky to the Southern borders of Georgia. It also does well when grown in connection with other plants as forage, both for use as a soiling crop (cut and fed green) or to be cured as hay.

We recommend a very early sowing for oats when sown by themselves, and with this in view it is best that the ground be plowed deeply the preceding fall, or during the winter, when the soil is in good workable condition. Then in the spring, just as soon as the land is dry enough, scarify it well with the harrow or run a small toothed cultivator over it and sow or drill in the seed. From $2\frac{1}{2}$ to 3 bushels of oats per acre are usually sown, and the yield runs from 30 to 100 bushels per acre.

A winter variety known as the winter turf oat, has been tried extensively and has succeeded well. It is a vigorous grower, standing from $3\frac{1}{2}$ to 4 feet high, tillers heavily, a single seed often producing from ten to twenty stalks, each topped by a plump, well filled head. A variety well known at the South is the red rust-proof. Other good varieties, some being of a more leafy habit and for this reason more

valuable when cut as hay, are the Lincoln oat, the black mammoth cluster and the black and white Russian.

OATS AS A COMBINED CROP.

Oats and Wheat.—These grown together furnish excellent fodder, and a much heavier growth is obtained than from either sown separately. The seed should be mixed thoroughly before being sown, equal quantities of each being used. Some light pasturing may be done on this crop, but its value is principally in the fodder made from it by cutting and curing when in the milk stage, for the heads should never be allowed to ripen when it is to be cut and cured as fodder. It can be mowed and handled like hay, or reaped and bound like wheat or oats alone. This crop is also useful when cut and fed green from day to day during the growing season.

Oats and barley sown together furnish a splendid pasture for sheep and pigs. Stock should be turned in just as soon as they are grown so as to cover the ground, as when the grain begins to head it is not relished so well. The yield of forage will be found to be much heavier when these two plants are grown together than when sown separately. From 2 to 3 bushels of the mixed seed are required for an acre.

OATS AND COWPEAS.

At the North a mixture of oats with the ordinary English field peas has proven very valuable and satisfactory; here the better mixture is oats and cowpeas in the proportion of 1 bushel of peas to $1\frac{1}{2}$ bushels of oats. If the peas are sown first they should be pretty deeply covered, followed by the oats at a less depth; but the better plan is to drill them in

together, covering them well, and a good crop can almost invariably be secured. If crab grass chances to grow among the peas and oats, so much the better, all are sweet and nutritious and will make excellent hay.

This crop is not an exhaustive one to the land, although a great tonnage of feed is produced, the soil being positively improved and fed by the nitrogen drawn from the atmosphere by the cowpeas, and stored in their roots, while the stubble of the oats plowed under returns to the soil a good portion of potash and the phosphates.

There is another feature which makes these combined fodder crops desirable, and that is, that as a ration for stock they are found to be much more appetizing than either one alone. Stock relish and thrive upon this combined hay, having almost if not the full alimentary value of a grain ration, wonderfully.

Experiments should be made in our different Southern climates, and on our varied soils, on our seaboard plains, prairies, rolling uplands, alluvial bottoms and mountain table-lands, of these combined fodder and forage crops, such as cowpeas and crab grass; Bermuda grass and red clover; clover and Timothy; clover, Timothy and orchard grass; oats and cowpeas; oats and wheat; oats and barley; winter oats and winter rye, etc., so that the combination best adapted to each particular district may be ascertained. What is best for the red clay hills of upper Georgia may not be quite as good as some other combined fodder crop for the dark, fat, unctious lands of Louisiana.

It will cost but little for any farmer to make a test, to plant a few acres of either of these combined crops, and note the results. It is certain that the Southern farmer should get

away, as soon as possible, from the idea that corn is the only fodder plant, and cotton the only money crop at the South, and that the only way to save fodder is to *pull* it in the old-fashioned way, when a hundred times as much and as good, if not better fodder, can be had with less work and with less drain upon the soil, by sowing and curing these combined hay crops. There is another point in favor of raising these smaller grains as fodder plants, and that is, that they are grown, cut and stored away long before a corn crop can be made; long before dry spells come on that may blast and spoil a corn crop.

Another point not to be forgotten in favor of raising small, strawy grains as fodder plants, in the place of corn, is the bedding they furnish for stock, when the animals are kept under sheds at night.

We take up' this question under the head of *Manures*, on another page, but as the subject is of great importance, it will do no harm to say here, that the object is not that the animals may have a comfortable bed, although this is not without its importance, but that a *mat* may be furnished which will bind the manure together, making it easy to be handled, while it also absorbs the urine and so conserves the ammonia.

Never burn wheat, barley or oat straw, it is of great value; save it and bed your stock with it. Twenty head of stock kept up at night in small pens or sheds, and heavily bedded with straw, the manure and tramped straw being forked out every morning into piles, will, even in one of our short Southern winters, produce from 300 to 500 wagon loads of most excellent fertilizing matter.

BUCKWHEAT

Is successfully raised at the South, and is found to be one of the best crops to put on land infested with foul weeds or grasses, to kill them out. It has been tested for this purpose by some of our Agricultural Experiment Stations, and is found to succeed admirably, exterminating even Bermuda grass (which, next to coco is perhaps the most difficult grass to kill).

Sow buckwheat from the first to the middle of May, 1 bushel to the acre. It will grow on almost any good upland, or even low, rich land, which being undrained, may be too wet to plow and plant in the spring. Such lowlands, when they have dried out in the summer, can be profitably sown to buckwheat. The Japanese variety is said to be much superior to the old sort.

BUCKWHEAT AS A MANURE.

The roots of this plant penetrate deeply into the soil, tending to pulverize it and make it lighter; growing readily on land too poor to grow clover, and growing rapidly, being ready to plow under in six or eight weeks, this plant has often been used to renovate exhausted soils. The copious foliage, and easy decomposition of the stalk, together with its depth and extent of roots, and the source whence it derives the greater portion of its supplies, render buckwheat peculiarly favorable for a manurial crop. Three crops may be plowed under in a single season, and a single crop equals in effect a dressing of manure applied at considerably greater cost. Buckwheat is specially rich in phosphoric acid and in potash.

HARVESTING.

Though the blossoms continually forming will produce grain as late as the season will allow, that first ripened is heaviest and most valuable. It should be cut, perhaps, as soon as the lower leaves begin to die, and with the cradle or harvester, if possible. If a frost should occur and any portion of the grain be ripe, it is best to harvest at once. After cutting, the swaths are raked into small bunches, and set upright with the heads twisted together—leaving each bundle to stand alone, the butts spread and resting upon the ground. Rain injures it but little if thus treated, and it may stand several weeks, or until thoroughly cured.

Buckwheat shells very easily, and much waste often occurs before the crop is secured. Care in handling and the use of tight bottom-boards for the wagon upon which it is drawn to the barn, will prevent this loss to a considerable extent. In case some other grain which would be injured by the mixture, is to follow this crop, some means must be used to extirpate it from the soil. Pigs will consume much of that lying on the surface, and lightly harrowing will cause the remnant to vegetate, and the first frost will destroy the young plants.

The action of the growing of buckwheat on different soils is as varied as these soils may be ; on some the effect is to build it up and enrich it, and on others it takes from the soil the elements required by other cereals, such as corn or wheat, so that good crops of these cannot be grown there succeeding it, while in other localities they follow it admirably. There is no doubt but that buckwheat is a rank feeder, as its growth is heavy and dense, and when plowed under as a fertilizer it

has proved to be of great value. But where harvested for the grain, its effects are doubtless exhausting, and the roots and stubble are nothing near so valuable in furnishing nitrogen and other fertilizing properties to the soil, as our Southern cowpea.

YIELD AND PROFIT OF THE CROP.

Though buckwheat will grow without manure, it feels the application as quick as any other plant, and a corresponding increase in growth is produced. Plaster and ashes exert an immediate influence and benefit.

In repeated statements of the usual average product, we find 20 bushels per acre the lowest, and 30 the highest estimate. The culture is not expensive, the time occupied only about ten weeks, and any surplus is readily marketable at fair prices, the average being \$1 per bushel.

As a honey plant for bees, buckwheat stands at the head of the list, and as a chicken food and egg producer it is said to be excellent.

TEOSINTE.

This new fodder plant certainly deserves the attention and investigation of Southern farmers. It is said to be of Central American origin, but has been tried and found very successful in Egypt and other oriental countries, where, on rich soils, yields of vast magnitude have been reported. On such lands as our best Southern sugar and cane lands it attains a height of from 11 to 12 feet, and eighty-five stalks are reported to have grown from one seed. From this it will be seen that it is of a branching habit and has great vigor of growth.

Upon a trial of this plant made at the Agricultural Experiment Station at Newport, Ark., on unmanured, sandy soil, a yield at one cutting of over $3\frac{1}{2}$ tons of dry fodder per acre was obtained.

At the same place and on the same kind of soil, oats cut as hay yielded 1 ton per acre, which was followed by a crop of cowpeas on the same ground that season, yielding a little over $1\frac{1}{4}$ tons (2,600 pounds) of dry hay, or of peas and oats 4,600 pounds, a little over $2\frac{1}{4}$ tons of hay, as compared with $3\frac{1}{2}$ tons of the teosinte hay, all being grown alike, without manure or other fertilizers. It is recommended to plant in rows 3 feet apart, and 12 inches apart in the drills, but this may be found too close on rich soils.

The *Rural New Yorker* of October 5, 1895, says of teosinte:

"The plants have made a wonderful growth. The seed was planted in mid-May. July 8 the plants were 3 feet high, with an average of nine stems, small and large, to a seed. Several plants were cut back to the ground. July 29 the plants were 4 feet tall, with an average of 12 stems to the seed, about the size of sweet corn of the same age. The cut back plants were 2 feet high. Cutting back the stalk does not seem to check the growth at all. August 19 the stalks were 6 feet high—the cut back plants 5 feet. The stalks were all tender. The longest leaves were 4 feet and in width $2\frac{1}{2}$ inches. The joints grow so close together that the plants are one mass of leaves. The stems were still small and succulent. We found the number of stems of one plant to be 17, of another 26. On September 2 the plants not cut back were 7 feet high, a mass of leaves, 3 to 4 feet long, and 2 or 3 inches wide; those cut back were 5 feet high. On September 17 the plants

were 9 feet high, the cut back plants 7 to 8. Still the stalks were quite tender and succulent; the leaves 3 to 4 feet long. There were no hard, tough, woody stalks, as we find in the corn plant at and before maturity. Again, the plants do not lose their lower leaves; they remain as green as those above.

"Except that it bears no grain in this climate, it would seem that teosinte should prove more valuable as a fodder plant than any kind of corn."

Teosinte will undoubtedly mature its seed in the extreme southern part of the Gulf States, and should be grown there for that purpose, and it should certainly be given a full trial in all parts of the South as a fodder plant. A source of supply of $3\frac{1}{2}$ tons to the acre at one cutting and doubtless of at least 5 tons at two cuttings, of dry fodder, sweet and nutritious, raised on light sandy and unmanured land, ought not to be overlooked and passed by without full trial even if the seed has to be bought every year.

The juice of teosinte is said to be rich in saccharine matter, and it is therefore very nutritious and fattening to stock, which are very fond of it.

The testimony of many farmers who have tried it in different parts of the country was put on record last year (1895) and was universally favorable, some reporting a yield on good soil of 100 tons of green, or 10 tons of excellent dry fodder per acre. It requires similar cultivation to corn. If put in drills, plant 3 feet apart, and two or three seeds every 12 inches in the drill. Four pounds of seed will plant an acre in this manner, or 3 pounds, if planted in hills, costing now 15 cents per ounce, \$1.50 per pound.

NON-SACCHARINE SORGHUMS.

The most noted of these are Kaffir corn, Jerusalem corn and Dhoura (or Millo maize). These bear dry weather well, and where corn will fire up and wholly fail for want of seasonable rains, these grains simply suspend operations, live on, wait for the rain, and when it comes go right on and perfect their full growth and yield. They should be tried in all parts of the South more extensively than they have been, especially upon the sandy lands of Florida and in the dry regions of western Texas and Arizona.

But it should not be taken for granted that because they are by the nature of their growth adapted to dry regions that they will not do well in the South generally, it may be proven that at least one or two of them are well suited to those parts of the South (embracing nearly the whole of it) which have a plentiful rainfall during the spring and summer months.

These plants are said to yield more weight of grain per acre than the same land will in corn, and to give enormous returns of excellent dry fodder at a far less cost than that of gathering corn fodder in the old way. They are cultivated in precisely the same way with corn and should be planted on rich, *deeply plowed ground*. If the land is not naturally rich it should be made so by the use of manures. It is not expected these grains will supplant corn as breadstuffs, but in furnishing ample fodder and stock food they are well worth trial at the South, where our long summers and late falls give ample time for their growth and maturing.



Part III.

Truck Farming.



N this part, No. III., upon truck farming, we shall make extensive quotations from a bulletin published by the North Carolina Agricultural Experiment Station, written by W. F. Massey, horticulturist, of the faculty. We inclose these in quotation marks, and insert his initials, and it will be understood all matter so marked is from his pen. His statements may not in all minor points coincide exactly with what we have said, or the experience of others, but are undoubtedly true of conditions in central and eastern North Carolina; and Mr. Massey's high reputation and long experience as a horticulturist, give his remarks great value.

PREPARATION OF LAND FOR TRUCKING.

(W. F. M.) "There is no one point upon which our people more commonly err than in supposing that any piece of mellow land, suited for trucking, but not rich, can be made at once to produce a paying crop of vegetables of all kinds by

the excessive use of fertilizers upon it. While such crops as the English peas may be produced on such land, the man who would undertake to grow a crop of early cabbage on it would be pretty certain to fail to get a paying crop. No matter how good the soil is for the ordinary farm crops, it will not be in condition to give the best results in garden vegetables until after several years of good culture and heavy fertilization. And while the commercial fertilizers contain all the elements of plant food that stable manure has, and in better proportion, the vegetable matters in the manure not only have a good mechanical effect on the land, but they keep up the formation of nitrates in the soil. The commercial fertilizer lacks this, and the lack must be supplied if we keep up the productiveness of the land. Decomposed vegetable matter from the forest will do this, but this is an expensive thing to collect and haul. The most rapid and economical way in which the vegetable matter can be gotten in the land is by the growth of some leguminous crop on the land. For this purpose there is no crop in this latitude equal to the Southern field or cowpea. This plant, in common with all the pea family, has the power of capturing the nitrogen from the air and fixing it into the soil for the succeeding crop. Its heavy growth above ground, the greater part of which, too, comes from the air, furnishes a larger amount of vegetable matter than would be gotten in the heaviest dressing of stable manure.

"The field pea gives the Southern gardener a great advantage over those in a Northern climate, because it can be grown after his early crops are shipped, as a preparation for his winter ones, and he can thus do as much in the way of supplying his soil with organic matter and nitrogen in one season as the other man can in two, and at the same time

raise a valuable forage crop, for as the soil becomes well stored with vegetable matter we do not think that it is advisable or economical to bury the whole growth. The growth of tops will be of more value for feeding stock, and by the careful saving of the manure he can return to the soil nearly as much of manurial value in a much more available condition. The keeping of dairy cattle in connection with the market garden is thus made practicable and profitable. The manure thus made is also a great help in the saving of commercial fertilizers. On highly manured truck lands the growth of crab grass, which comes in naturally after the removal of crops late in summer, is another valuable aid in the feeding of stock. Wherever there is a ready sale for dairy products it will always pay to keep cows for the consumption of the forage that can be grown so heavily on these lands, and to use the utmost care in the saving of all the manure.

MANURES AND FERTILIZERS.

"While it is doubtless true that for most vegetable crops the manure of the stable and barnyard is the best possible, few gardeners, particularly Southern truck gardeners, are so situated as to be able to get all they need, and in some places it commands a price that makes it a less economical manure than the commercial fertilizers. Then, too, there are some crops that are actually better grown with commercial fertilizers, as the Irish potato, for instance, in which the use of the manure of cattle is apt to encourage the growth of the fungus causing "scab." But, as suggested above, every truck grower should endeavor to make all the manure that he can by the profitable feeding of stock.

"When fertilizers are depended upon exclusively, the green manuring with the cowpea becomes of the utmost importance, and until the soil is well filled with humus, it will pay to plow them under. When a heavy growth of pea vines is to be plowed under, they should always be allowed to get their full growth and to die upon the land before plowing them down. They have then done all that they can for the soil, and in dying there is no loss of any appreciable fertilizing value, since they part with the water only. There is then, too, no risk of dangerous fermentation, as when a heavy green growth is plowed under in hot weather. In using the manures from the stable or barnyard, the truck gardener needs to have them piled and reduced to a fine condition by slow fermentation. Coarse and fresh manure that a farmer can use on a grass sod profitably will not do for him. Thorough decomposition is essential to get the mass into a state in which it will give up its plant food most readily. Piling and composting, while seldom profitable for the grain farmer, is of importance to the gardener. Those who are so situated as to be able to get the sweepings from paved city streets can profitably use this material for composting with their stable manure, and the black mold from the forest can also be used to advantage. These materials should be put in thick layers with the manure in a broad and flat-topped pile, which should be chopped down perpendicularly, and thoroughly mixed by turning several times before using. The object is to keep up a slow fermentation and to check injurious heating, thus getting the pile into the condition of black moist mold, suitable for using in the hill or broadcast, as occasion may indicate."

The market gardeners near Charleston, S. C., and probably also those of the neighborhood of Norfolk, Va., make

great use of the rakings of the pine woods, the pine straw and other debris that falls upon the ground each year. The cheap negro labor in these localities enables them to take advantage of this supply of fertilizing material which is hauled out of the woods, put in long beds and composted thoroughly with well decomposed stable manure. When thoroughly composted, this in connection with commercial fertilizers, is found to be eminently valuable. Such expenditures as this however, may not be found necessary upon the newer virgin lands of the Southwest.

LIME AND ITS USES.

(W. F. M.) "Lime is one of the essential elements of plant food which must be in the soil to enable any plant to grow. But for all the purposes of plant food many of our arable soils contain an almost inexhaustible supply. But lime has been found to have value in the soil aside from its use by the plants as food direct. The chief of these uses, in a soil well stored with decomposing vegetable matter, is in promoting the growth of the nitric organisms that change parts of this organic matter into nitrates, and thus make the nitrogen, or organic matter, available as food for plants. Lime also corrects injurious acidity in soils, aids in the breaking up of insoluble compounds of potash, thus rendering that base available to complete the work of the nitric ferments, and also has an important mechanical effect in the soil, making a clay soil more mellow, and a sandy one more compact. On lands cultivated in trucking crops, and heavily fertilized, and with frequent green manure crops buried in it, an occasional liming has a very beneficial effect. This will be particularly noticeable on the cabbage crop. While shell

marl will to some extent have the same action, the insoluble form of the lime, as it exists in the marl, renders its action less marked and immediate than that of freshly water-slacked lime.

LAND PLASTER, OR GYPSUM (SULPHATE OF LIME).—“The action of plaster on any given soil can only be learned by trial. On sandy soils, near the coast, it is seldom so beneficial in its action as upon the clay soils of the interior. We have seen very decided benefit, on some soils, from the use of plaster as a top dressing on the crop of early ‘snaps,’ or string beans. It is also sometimes very efficient in promoting the growth of clover or peas. But as there are many soils on which plaster seems to have no effect whatever, nothing but experiment can determine its value on a given soil.

COMMERCIAL FERTILIZERS.

“As we have stated, the three constituents of plant food that are most generally deficient in our old soils, are nitrogen, potash and phosphoric acid. In ordinary farm crops it is practicable, by the use of the leguminous crops, like clover and peas, to get a sufficient amount of nitrogen from the air, but this, while a valuable help, will not supply it in sufficient amount for immediate use for the purpose of growing the early vegetable crops of the Southern market gardener. For many of his crops an artificial combination of nitrogen, in a readily available form, is of the greatest importance. In the absence, then, of a plentiful supply of well rotted stable manure, he must resort to some commercial source of nitrogen. While the nitrogen in commercial nitrate of soda is in the most readily available form, it is evanescent, and in practice it is found better to mix with it some more slowly

available form, as in organic matters, like fish-scrap and cottonseed meal, to keep up the supply through the season of growth. Of these we give the preference to the cottonseed meal, since it is more accessible to all growers in the South. Cottonseed meal has the further advantage that it supplies also some potash and phosphoric acid. The common source of this last is the phosphatic rock of North and South Carolina. This is changed into a soluble state by being dissolved in sulphuric acid, making what is commonly called 'acid phosphate.' This is probably the cheapest form in which phosphoric acid can be had in the South. Potash exists in a very soluble form in hard-wood ashes, and the ashes of cottonseed hulls are particularly rich in it. Where these last can be had, they furnish the best possible shape for potash, but as they can seldom be bought by the gardener in sufficient quantity, he is compelled to resort to some other combination. The great source of potash now is found in the various potash salts mined in Germany, and imported here under the names of kainit, sylvinit and others. The crude forms of the salts are seldom available for the use of the market gardener, on account of the large proportion of common salt which they contain. This prevents the heavy application of the crude article, as we would thus get for most crops an injurious amount of the salt. The concentrated forms of the muriate or sulphate of potash are the forms in which gardeners use the potash salts, except for asparagus, on which the kainit does as well. For most garden crops the muriate of potash will usually be found best.

MIXING CHEMICAL FERTILIZERS.

" There are innumerable brands of mixed fertilizers offered by the men who make a business of preparing these in different proportions for various crops. But oftentimes it will be found easier and more economical to mix the ingredients, which can be purchased for this purpose, bearing in mind that the more concentrated form in which he can get these generally the cheaper, he will get the essential constituents, potash, phosphoric acid and ammonia (or nitrogen). Most manufacturers of fertilizers give the percentage of nitrogen in a mixture as ammonia, as this custom has grown universal from early practices. Ammonia is a compound of nitrogen and hydrogen, which has the properties of an alkaline base, and unites with acids to form salts. The sulphate of ammonia and nitrate of soda are two of the most concentrated forms in which we can get nitrogen, and are valuable forms for the truck gardener's use. One can readily ascertain the relative cost of the nitrogen, potash or phosphoric acid in a fertilizing ingredient, by dividing the price of the ingredient in the market by the percentage of these it contains, and thus find in what shape it is cheapest. A highly concentrated form makes a great saving at times in freight and handling.

" There are many advantages in mixing the constituents at home, as in that way particular ingredients can be used for special crops, or advantage be taken in using local supplies. The purity of these ingredients can also be ascertained, and their proportion in the mixture can be altered to secure any desired percentage. When buying the ingredients, they should always be purchased on a special guarantee.

When mixing at home, the materials should be as dry and fine as possible, and should some be lumpy, as in the case of the potash salts or nitrate of soda, the lumps should be mashed before attempting to mix. A clean floor should be used for the mixing, and the ingredients, weighed out in the proper amounts, should be poured on top of each other in alternate layers. Two hands with hoes, on opposite sides of the heap, can mix the layers rapidly, at a cost not to exceed 50 cents per ton. When mixing a small quantity, a small wagon-body is very convenient to use. Where large quantities of fertilizers are used, and sufficient power can be had, it will pay the grower to provide the necessary machinery for mixing the ingredients.

SEED AND SEED SOWING.

"There is no point in horticulture in which so great an improvement has been made in this country as in the quality of the seed offered for sale to the gardener. The art of seed sowing is better understood, and the requirements of our climate have been studied by practical men. The writer can well remember when dealers prided themselves on the fact that the seed they offered were 'English' seed, not knowing that with many plants American grown seed are infinitely superior for use. In the days of the old 'Early York cabbage, we remember with how much of uncertainty the seeds were sown, not knowing whether any of them would make a solid head. And not until the 'Early Jersey Wakefield' cabbage was developed from the English Wakefield, by continuous selection in our climate, did growers fully realize that for certainty of crop it was necessary that cabbage seed for American use must be grown in America.

"The question of climate in relation to its production, has been more closely studied of late years, and no well informed gardener now supposes that all the seed he needs can be best grown in one climate. The fact that many sorts of garden seed are better for the production of the earliest crops when grown in high latitude, led to the notion that all seeds produced in a Northern latitude are necessarily superior to those grown in the South. There is no greater error in horticulture. There are many seeds that do not reach their best development, as crop producers, in any given locality, when they are grown far north or south of the latitude where they are to be sown. While the market gardener can seldom afford to grow his own seed, there are some which he can generally produce to advantage, if unable to get them from a reliable grower in his own latitude and elevation, for elevation above the sea has the same effect on many crops as high latitude. In this class should be placed such seeds as those of Indian corn, egg plant, tomatoes, Lima beans, okra, cucumbers, melons and a few others. It is also a well established fact that the late fall grown crop of Irish potatoes produced in the South makes far better tubers for growing the early spring crop from than those produced in the Northern latitude, a fact that is rapidly revolutionizing the practice of gardeners, not only in the South but in the North as well. One of the chief reasons for the common failure to grow good crops of sweet corn for table use in the South has been the fact that our people so commonly get the Northern grown seed for planting. Indian corn, more than most other plants, fails to do its best far south or north of the place the seed is grown. Indian sweet corn, grown and carefully selected for seed in our latitude, will produce far

better results here than any seed we can get from the North. Garden peas, snap beans, and some other seed, we had always better have of Northern growth. The radish seed sold by our best seedsmen are produced in France, experience having proved that they can be better grown there than here. But there is one point in regard to seed that is not sufficiently understood by our gardeners generally. This is what we may call 'pedigree.' Thoroughbred seeds are of as much importance to the gardener as thoroughbred horses are to the race course. It takes a long course of skillful culture to establish a 'race' in plants that will with certainty reproduce itself. There is a constant tendency in all plants to revert to an original, and, generally, an inferior type. Hence the necessity for skill and care on the part of the seed grower. Experienced planters understand this so well that they are more concerned about the strain from which their seeds come than about the relative percentage of vitality, though both are of importance. No class of business men are so minutely careful as our well known seedsmen to guard the purity and vitality of the stock they offer. The sharp competition between them to get and keep the best strains of the various garden seeds, and to retain the trade that they could only have acquired by such care, is the best guaranty that the gardener can have. The dealer who gets and keeps the trade of a large number of market gardeners around him, must of necessity sell a good article. Experienced gardeners will often be found buying a certain strain of common vegetable from a certain stock, and from no other, though they may possess the same vitality, because they know the value of pedigree. All the little Extra Early garden peas, for instance, are the same kind of pea, though branded with

various names by the dealers; but the stocks of some are more sought for by market gardeners because they have found them to be more carefully kept to the type than some others, or better 'rogued,' as the term is, that is, the plants that show a tendency to revert to an inferior type are kept pulled out of the crop. The stocks from which our leading seedsmen get their seeds are nowadays of such general purity that any one can usually get just what he wants if he deals with a man of reputation. In most things it costs a Southern market gardener too much to attempt to save seeds, but if he grows nothing else he should always grow his own seed potatoes, and, in fact, should usually grow a surplus, as there is always a demand for them at planting time.

DURATION OF VITALITY IN SEEDS.

"There is a great difference in different plants in this respect. Some seeds quickly lose their vitality, while some retain the power to germinate for a very long time. Lettuce seed are not usually ranked among those which retain their vitality many years, but when well kept they may be trusted for several years. Beet seed will retain their germinating power for at least ten years under favorable conditions; cabbage, kale, radish, tomato, spinach, turnip, asparagus, broccoli, cauliflower, beans and peas are all good for four years or more; while pumpkin, cucumber and melon seed will keep for ten years. Onion and leek seed are not to be relied upon after the second year, and their vitality is much weaker even in the second. But it must be borne in mind that these figures refer to seed that are kept under the most favorable conditions. In the moist climate of our Southern

coast the duration of vitality will usually be found to be shorter, and no one should trust onion seed here after the lapse of a year in our climate. Melon and cucumber seeds are more fruitful when two or three years old than when perfectly fresh, but make a less vigorous growth of vine. In all other cases perfectly fresh seed should be preferred. In all cases get seed from a seedsman of established reputation, and do not trust to seed put out on commission at country stores.

TIME FOR SOWING.

"All seeds usually sown in the open ground vary in their requirements for growth. The vital principle in seed requires three conditions to induce germination—moisture, a proper degree of heat, and access of the oxygen of the air. They all have a minimum temperature at which they will start into growth, some at a much lower point than others. Onions and English peas will germinate at a temperature but little above the freezing point, while the seeds of corn, cucumbers and other tender plants will rot if exposed to moisture at such a temperature. It is evident then that care must be used in sowing seeds at times when the temperature is suitable to the nature of the plant. The practice of soaking seed in water to hasten germination is seldom advisable, for unless the soil is in exactly the proper state of warmth and moisture at sowing, more harm than good will be done. If, at the time of sowing, the soil is dry it is always better to compact it over the seed, either by tramping with the foot on a row after sowing (as Mr. Peter Henderson used to insist upon), or by rolling. But if the soil is moist, either of these practices will do more harm than good.

As a rule all garden seeds should be sown in drills and not broadcast. Exceptions to this will sometimes be found profitable, as I have found it profitable to sow an early spring crop of strap-leaf turnips broadcast, and at times to scatter seed of radishes among other slower growing crops, but the rule holds good that the best crops are to be looked for from sowing in rows, careful thinning and clean cultivation. No market gardener should ever sow seed by hand. There are now several effective garden seed drills, and no one can afford to sow seed by hand. The depth at which seed are sown is governed by the character of the soil, the time of the year, and the moisture present. In a general way it may be said that the size of the seed should govern the depth of planting, but there are exceptions even to this, for the seed of the Lima bean, one of the largest seeds sown should be but barely stuck in the soil, eye down. The old rule is to cover the seed about three times its thickness with the fine mellow soil, but in many light soils this will hardly be sufficient for many things. Seed need deeper covering in sandy than in heavy soils, and the soil over all seeds should be made as fine as possible."

Vegetables.

IRISH POTATOES.

It used to be thought that *early* Irish potatoes alone could be successfully grown in the South, and these, while profitable for early shipment North, or immediate sale in our larger towns, would not keep well; but within the past few years it has been found that a late crop, planted with seed of the early one dug before they are fairly ripe, say when they are as large as hen's eggs, or as some advise with seed of the second crop grown the previous year, produces potatoes that keep admirably. We do not suppose that in the coast region of the South a second crop can be grown, the summer and fall weather may be too warm and dry for a good stand to be secured, but they are found to succeed and are profitable when grown in the northern tier of Southern States, such as North Carolina, the Virginias, the northern part of Georgia, Tennessee, Kentucky and Arkansas, the latter State having lately taken a very prominent place in the raising of this product for shipment.

(W. F. M.) "The soil for the early potato crop should be a mellow sandy loam, well supplied with vegetable matter. Land newly cleared from the forest is excellent, but the best preparation on old lands is to grow a crop of peas on the land the previous season and let them die on the land to be plowed under for the crop. The plowing under should be done as soon as the vines are dead in the fall, as if plowed under just before planting they are apt to promote the scab fungus. Planting should be done here as soon as the land

can be gotten in good order after the middle of February, or even sooner, and they may be planted during the first half of March with good prospects of success.

"Various experiments have been made to ascertain the best mode of planting potatoes, whether to cut them to single eyes, two or three eyes, or to plant whole potatoes. It has been shown that planting whole potatoes usually gives the largest crop and single eyes the smallest; but the great quantity of seed potatoes required to be kept or bought to plant them whole will always be a bar to this practice. As a rule we have found the best results, as to profit, have been from cutting the potatoes into pieces containing two or three eyes. These are dropped into furrows $2\frac{1}{2}$ to 3 feet apart and 15 inches between the pieces. The fertilizer is spread along the furrows with a machine that scatters it in a broad band in the furrow and on both sides of it. It is then worked into the soil in the furrow before planting. Covering is done by turning a furrow from each side over the planting furrow, so that the potatoes are surrounded by the fertilizer, and a sharp ridge is made over the row. We leave this ridge until the potatoes are about to start when it is harrowed down and the soil is left in good order for the sprouting potato. We have also found that it is a saving of hand work, as soon as the potatoes can be seen along the rows, to run a smoothing harrow crosswise of the rows. This destroys the weeds and grass just starting in the hill and gives a good working. While for the late crop we favor flat culture, the early crop in the South should, we think, be always laid by with a furrow to each side, as the ridge gets warm much quicker than the level surface. The potato grows at a comparatively low temperature, and the warmth of early spring weather starts

them into a vigorous growth to which a sudden return of frost would be fatal. When this is the case, and the potatoes are well advanced in growth, if the weather service predicts a coming cold wave, the plows should be started at once and a furrow plowed over the tops of the plants. This will protect them from being cut down. One of our largest growers reported last summer that the potatoes he covered just before the frost of March 26 all matured early and brought a good price, while those he did not cover were cut down and were so late that the market was glutted when they went in.

"To bring the best price the potato crop should be ready to ship early in June. They are carefully culled in the field and only the finest are shipped unless the price rules high enough to make it pay to ship culls. They are shipped in barrels and covered with bagging."

The early crop is usually planted about the middle of February, is ripe from the 10th to 20th of May, and is shipped North, usually in carload lots, arriving there two months before Northern grown potatoes are in market.

The second crop is planted about the 1st of August, and although from this planting the yield is usually less than that of the early one, yet as this late crop matures at a time when potatoes usually bring a good price at the South, and as they keep well all winter, and furnish the best of seed potatoes for the next season's early and late crops, they are profitable.

SECOND CROP POTATOES.

A difficulty is sometimes experienced in securing a good stand for the second crop, and if the weather should prove warm and dry, the plants are apt to come up weak and spindling.

The Arkansas Experiment Station, at Camden, Ark., recommends the bedding out of the seed potatoes in July for the second crop (dug from the first crop), the same as sweet potatoes are bedded, covering the potatoes 6 inches deep with good soil, and watering the bed until the sprouts are well started, when the sprouted tubers are taken up carefully and planted.

Others recommend a lighter covering, say of 3 or 4 inches of pine or other leaves, or hay or straw mixed with sand, and this covering kept well watered.

There seems to be some difference of opinion as to the best plan to be used, some maintaining that the seed taken from the early crop of the same year should be *replanted immediately*, before they have time to dry.*

Just as strenuously is it insisted, that the proper plan is to dig the potatoes of the first crop before they are fully matured, and "put them in an open shed, so as to be out of the sun, but have plenty of light. Let them lay three or four weeks, then cut and plant, covering deep." † Our own experience leads us to believe the latter mode not a successful one, and to recommend either instantaneous planting, giving the tubers no time to dry out, or to sprout them in a well watered bed, according to the Camden plan.

In regard to the time to plant the second crop, this will vary in the different parts of the South—in the northern and higher altitudes they should be planted in July; in the more southern parts of the South the 1st of August may be better.

*Proceedings Arkansas State Horticultural Society, 1894, p. 114.

†Proceedings Arkansas State Horticultural Society, 1893, p. 81.

(W.F.M.) "At this Station we have made regular experiments for several years to devise the best mode of producing this crop with certainty, and have settled upon the following as the best mode of treatment. The potatoes from which it is desired to grow the second crop should be allowed to remain where they grew till perfectly ripe and the tops dead. If they are selected from the culls in digging the partly matured crop for shipping, there will be much uncertainty as to their sprouting. When the tops are dead, take them up and allow them to remain a day or so exposed to the light until they turn greenish. Then spread them in any convenient place on the ground and cover them with pine or other straw. Sprinkle the straw and thereafter never allow it to get dry all through.

"Prepare the land as for the early crop except that the fertilization need not be so heavy, and run out the rows by going twice in a furrow with a turning plow and clean out the furrow full 6 inches deep. As the potatoes under the straw begin to start the eyes, which will be from the first to the middle of August, plant them in the deep furrows, but cover them not more than an inch over the top of the tubers until the green leaves begin to grow. Then gradually fill in the soil to them as they grow, until it is level. The after culture must be as level as possible and no hilling should be done; the object at this season of the year being to prevent the drying out of the soil. The potatoes will sprout earlier if, before bedding them under the straw, a small piece is clipped off one end and rejected. No further cutting should be done when planting. The planting should all be done by the middle of August. This crop will grow green until the frost cuts the tops down, and their immaturity prevents their sprout-

ing before planting time, so that when they grow, it is with the strong growth of the terminal bud, which gives them a great advantage over the Northern potatoes, that have been long out of the ground and have had the sprouts rubbed off them in the cellar.

LATE POTATOES FOR TABLE USE.

"The growing of a late crop of potatoes for table use is a different matter from growing the crop for seed purposes. For the table we want a perfectly matured product. Therefore the planting should be earlier. The seed for this crop are the potatoes of the late seed crop kept over from the previous season. These will keep over in perfect condition for the planting in July. If kept in a cool, dark cellar they will seldom start their eyes until warm weather sets in. As soon as they show signs of sprouting remove them at once into full sunlight in a dry place. The sprouts will then form short, stubby and green, and will bear handling without rubbing off. They should be planted any time in July when the soil is in a good and moist condition. The planting and cultivation should be the same as for the late seed crop. This crop will be fully matured by frost and will keep well for table use. But do not attempt to keep any of these for seed, but select all seed from the regular second crop potatoes. This crop should become of immense value for the Southern home market, for our markets here are still supplied with potatoes from the North at prices that would be very profitable to the home grower."

As an ideal mode of culture for a main or midseason crop, Mr. Elbert S. Carman, editor of the *Rural New Yorker*, recommends to plow a piece of well drained land

thoroughly, 6 inches deep, then lay off with the plow, trenches running north and south (if the slope of the land is favorable) 6 or 8 inches deep and 3 feet apart; run a subsoil plow in the trench 6 inches deeper, pulverizing the soil thoroughly.

In this trench plant the sets 6 inches below the natural level of the ground, 1 foot apart, covering with earth evenly, or with straw, old hay or leaves and manure, scattered on top. This method insures the retention of moisture, which is essential to success in raising potatoes. The subsequent working should be shallow and level, *not hillling the potatoes*, which has a tendency to run the water away from the roots and to cut off the fine, long rootlets upon which the plant depends for the nourishment of the growing tubers. Planting in this case was done at the usual time for planting the main crop in that part of the country.

Another plan somewhat similar to the above has been tried at the South, and very heavy yields have resulted. The planting in this case is done quite late in the fall, or even at a date that at the North would be considered in the winter, say from November 20 to December 25.

The soil is deeply plowed and subsoiled, or worked deeply by hand with a spading fork; trenches 14 inches deep, $2\frac{1}{2}$ to 3 feet apart should then be dug, or opened with the plow, in the bottom of which good, sound potatoes should be planted and covered in with trash such as pea or bean vines, tomato or potato tops, chips from the wood pile, old hay, pine straw, wheat or other grain straw, or even shavings, or on the top a light dressing of manure and a light covering of soil, anything in fact that will prevent the soil from packing down too hard and will have a tendency to set

up a gentle fermentation and keep the potatoes warm in any hard freezes that may come in January or February.

They may not come to the surface as early in the spring as those planted later, but the ground above them should be harrowed frequently until they are up and they should then be worked as is customary, but not hilled very much. They will be found to yield heavily, double the quantity of those planted shallower in February. The Irish potato, unlike the sweet, produces all its crop *above* the seed, and by the method given above, room is obtained for a heavy yield. We think, however, for *very early* potatoes the February shallower planting or potatoes started under glass will beat them.

Mr. A. W. Poole, one of the largest raisers of potatoes in the South, does not exactly use the trench system, but breaks his land deep, and harrows; then plants in shallow furrows, by hand from a short sack hung by a strap around the planter's neck, near his waist. As each cut piece of potato, which he prefers to have of large size with two or three eyes, is dropped about 16 inches apart in the furrow, the planter *steps on it*; this, Mr. Poole affirms, is of the first importance as it packs the potato firmly in the ground and the soil snugly around it, and this packing tends to bring or retain the moisture so necessary to the strong growth and productiveness of this plant.

Mr. Poole emphasizes these points in planting Irish potatoes: *Plow land deep, furrow shallow, step on the sets with a good heavy shoe or boot as you plant, cover deep*, especially for the late crop, then as soon as they begin to sprout, harrow or knock off ridge over potatoes so as not to leave the potatoes more than 3 or 4 inches deep, then cultivate as nearly level as possible.

A yield of 400 bushels was grown on 1 acre on "chocolate" river bottom land, near Clarksville, Johnson County, Ark.—225 bushels the early and 175 bushels the late crop.

Potatoes pay well at even 100 bushels to the acre, sold at 50 cents a bushel; but kept in root cellars or out-door pits until spring, they will bring usually 75 cents to \$1 per bushel in Southern towns or railroad stations, in carload lots for shipment.

On testing grounds in New Jersey, over 1,000 bushels have been raised per acre by the use of high grade fertilizers and best methods of culture. Potatoes are an excellent crop to grow in young orchards while trees are coming to maturity. They are a fine money crop at the South.

And now comes a wonderful potato story from Texas. We give it for what it is worth. The statements can be easily verified. If they are true, they may be worth a great deal to our farmers. We take the statement from the *Scientific American* of January 25, 1896.

REMARKABLE POTATO GROWING.

"Mr. C. E. Ford, of Rusk, Tex., who writes that he has been taking and has kept files of the *Scientific American* for thirty years, * * * gives us particulars of the remarkable success he has achieved in raising potatoes. The potatoes he prefers for forcing are of the Early Rose variety, the vines or stalks growing 6 to 8 feet, and but seldom blooming or having balls. The Triumph is said to make a crop quicker than the Early Rose and to stand the dry weather better. Mr. Ford believes in 'intensive' culture, or the higher fertilizing and increased labor on a small piece of land, rather than little labor and fertilizing on a large tract. He sprouts his

potatoes to the size of English peas or marbles before planting, and then raises a crop in from four to six weeks, all of large size, without a peck of small potatoes to the acre. He writes: 'There were forty seed the size of peas planted to every double hill. I plant my potatoes in the water furrow and leave a balk 4 to 6 inches wide, and when the potato seed are dropped on the balk a part of the seed fall on each side of the narrow balk. I cover with two furrows of turning plow. I make my rows 3 feet apart; the hills 18 inches apart in row, which makes 140 hills across an acre and 70 rows to the acre makes 9,800 double hills of potatoes to the acre, or 19,600 single hills. As you will see, a hill of forty seed potatoes goes across the balk, making the hill cover some 18 inches, or half the ground.'

'I never plant less than twenty and have planted sixty, and the sixty will every one make as fine potatoes if we have plenty of rain. I also give my potatoes fertilizing with liquid manure every rain. It takes from sixty to seventy-five potatoes to make a bushel, never more than seventy-five. I have kept the same seed for twenty-six years and have potatoes both sweet and Irish the whole year round. By sprouting your potatoes you have eating potatoes in less than one-half the time it takes under the old style of planting. It takes from four to six weeks to sprout the seed potato to the size of peas; the sprout room I keep warm by a small charcoal fire in a bake oven. One barrel of charcoal will be plenty for the whole time. I put my potatoes into old barrels or small boxes, so as to get them warm easier than in a big heap or bunk. The smaller the boxes, the easier and quicker they will sprout. When the potatoes get large enough, I knock off the hoops, take down the staves, and there are

thousands upon thousands of small potatoes from the size of a bird's eye to that of peas and a few the size of marbles; the whole mass is held together with small roots. I take a hand barrow (not a wheelbarrow), and carry the seed down the row, and the third person breaks off as many as you wish, not less than twenty to forty—and let them fall on the balk in the water furrow and give two plowings. My sprout house has double walls and is filled in between with sawdust, also overhead, and has double doors."

In harvesting either sweet or Irish potatoes at the South, they should always be kept out of the sunshine, as the hot sun causes them to rot. Put them just as soon as dug, into a wheelbarrow, wagon or basket, *cover them at once*, and remove to a shady place where they should lie covered lightly with straw to sweat and dry. It is well to have a layer of straw also beneath them to keep them from the dampness of the ground. They can then, when they have passed the sweating stage, be stored in a dry cellar or potato house, where they can be kept at an even, low temperature (see article on potato cellars), or put up in potato pits or hills, containing 30 or 40 bushels each.

If to be stored out of doors, let the earth in the center of place where you intend to make your bed or pile be higher by at least 6 inches than the outer edges, sloping from the middle to the outside. Next put on a layer of pine straw, dry leaves or dry hay, and on these pile the potatoes in a cone, covering them with straw only for a few days, until they are well dried, then thatch them with layers of bark or pieces of boards over the straw, and finally cover all with 6 to 10 inches of dry earth, leaving a small opening at the apex for ventilation, which should be closed in very severe weather with hay. Some

recommend to put the earth upon the straw, and cover last with boards, leaving in either case an opening at the top for ventilation. Either plan will answer well. There is no difficulty in keeping Southern grown late or second crop potatoes perfectly through the winter in a potato house or cellar, if the temperature is kept at about 50 degrees, or they keep excellently in piles out of doors, such as we have described.

In shipping potatoes in carload lots in the spring, cattle cars are preferable, as they are better ventilated, but in the fall or winter tight box cars are best as less open to the effect of frost.

Having gone over the ground thus in a somewhat cursory manner, giving mainly the views of others, there should perhaps be a few words more said, a few points specially to be noted.

First. Do not plant potatoes on a piece of wet land—let it always be that which is well drained, naturally or artificially. While moisture is essential to the growth of the potato, a good crop cannot be grown on land soaked with water a good part of the year.

Second. A good crop of potatoes, a paying crop, cannot be grown on a poor or worn out soil. The very best preparation for growing potatoes is a crop of cowpeas, or red or crimson clover, plowed under. It is not the crop of 25 bushels to the acre, sold at 50 cents a bushel, but the crop of 200 to 300 bushels to the acre, sold at that price, that pays; therefore let the farmer work for the larger crop. He can get it if he will, with very little more expense than it costs to make the 25 bushel crop.

Third. The farmer should always bear in mind that *the Irish potato produces all its crop above the seed*; so if you

can give it room in a deeply plowed, mellow soil, made rich by the plowing under of suitable vegetable manures, you have secured for it the opportunity it delights in.

Fourth. In planting for the first crop, plant *early*; in February. For the second crop, our advice is, use partially grown seed of the early crop as seed for the second, putting them back in the ground without drying or greening them, planting pretty deep, and harrowing the ground frequently even before the potato comes up, to keep the soil mellow and moist. Do this *on a part of your ground*, and *on the balance* try the plan of sprouting the seed potatoes before planting them, by putting them in a bed *somewhat shaded*, and covering them with pine trash, leaves or straw, and keeping them *well watered* every day. By testing these two methods you will learn doubtless the best plan for securing a good stand for the second crop, a matter that is yet somewhat in doubt; and perhaps is affected by the different amount of rainfall and the condition of the soil in some years as compared with others.

Fifth. Some varieties of potatoes are found to be very much better second croppers than others; some in fact appear to be worthless for this purpose, being almost sure to rot in the ground. The Missouri Red has seemed with us to have this character; while Bliss' Triumph is universally conceded to be one of the best for this purpose. In fact it is first-rate either as an early, or second crop potato.

The Beauty of Hebron has proved a heavy cropper not only in the South but in experimental trials all over the country. The Early Ohio is also an excellent variety, and both of them should be tested in the South as second croppers.

After very extensive and thorough experiments, Professor Starnes recommends for Georgia, Pride of the South, Early Rose, Beauty of Hebron, Carman No. 1 and Peerless. For the second crop Lookout Mountain.

Sixth. The use of fresh animal manures is not recommended for either an early, or late, or second crop, especially not for the two last, and in fact even composts, or pretty well rotted manures, used after the hot weather has commenced, do more harm than good. The manuring of this crop should be done by the use of vegetable products plowed under the season before, or by the application of commercial fertilizers, such as acid phosphate, and potash; or if animal manures are used, they should be applied in a thoroughly decomposed condition, and put on the land the previous year if possible.

DISEASES OF THE IRISH POTATO.

In the complete and very valuable bulletin prepared by Professor Starnes, of the Georgia Experiment Station, we find the following:

"POTATO SCAB."

"For a long time the cause of this malady—as extensive as the cultivation of the potato itself—was unknown, and various agencies were charged with producing it. By some it was supposed to be caused by an excess of lime in the soil, or because the land was too wet, too stiff, or otherwise unsuitable; by others it was ascribed to the free use of stable manure; while from time to time divers insects have been erroneously saddled with the blame.

"It is due mainly to the investigations of Professor H. L. Bolley, of the North Dakota Experiment Station, and of

Dr. Roland Thaxter, of the Connecticut Station, that the origin of the scab is now understood, and the means of successfully combating it simplified.

"Briefly, it is found to be due to the inroads of a bacteroid fungus—*Ospora scabies*. This fungus, or perhaps more properly, bacterium, is generally conveyed and communicated to the growing crop by the seed tubers, in which it has made a lodgement, and this may be the case even when the tubers are perfectly smooth and apparently free from affection.

"At first there were supposed to be two distinct kinds of scab—the "surface" and "deep" scab; but of late they have been regarded as merely separate phases of the same malady, though possibly in the case of deep scab exaggerated by the operations of wood lice in the pits or holes which the bacteria form. Both appear to be identical with a similar affection of the beet. Either, if at all advanced, serves to render the affected tuber more or less unfit for market and in many severely contaminated sections operate as a veritable scourge.

"Fortunately the remedies, though preventive only, are quite simple and effective. In the first place, as the bacteria or scab may remain some time in the soil, it is necessary to adopt a strict system of crop rotation. Potatoes should never occupy the same plat two years in succession, and it would be better if the rotation could be so effected as to avoid the necessity for planting the same land in this crop oftener than every four or five years.

"In the second place, perfectly smooth and apparently unaffected tubers should be selected for seed. These should be well washed. If it is not intended to treat them further they should be lightly scoured with a scrubbing brush, though

not bruised or scratched. This alone will doubtless to a great extent diminish the evil. The tubers, however, when washed, if complete immunity is intended, should be immersed, before cutting, in a solution of corrosive sublimate (*mercuric bichloride*). Professor Arthur, who has closely investigated the subject, advises a strength of 1 to 1,000 parts of water, or 1 ounce to $7\frac{1}{2}$ gallons, and immersion therein for one and a half hours with sound tubers—a somewhat shorter time with sprouted ones, that their germinating power may not be destroyed. However, Professor Byron D. Halstead, of the New Jersey Station, has come to the conclusion, after repeated tests, that a weaker solution and a longer immersion are productive of better results. He recommends a solution of one-fourth the strength advised by Professor Arthur, 1 part of corrosive sublimate to 4,000 parts of water, which is equal to 1 ounce corrosive sublimate to 30 gallons of water, and an immersion of four hours.

"It must be noted that corrosive sublimate is a violent poison when taken internally, though harmless to the skin, and should hence be handled with extreme care. Only wooden or earthen vessels should be used in the preparation of the solution, and these should be locked up when done with and kept for this purpose only.

"To make the solution, purchase 1 ounce of the pulverized sublimate, or the exact quantity, in proportion, that is intended to be used, no more, in order that none may be left over. It will cost at most druggists 15 cents per ounce. Thoroughly dissolve in 2 gallons of hot water in a cheap wooden bucket. Take a 50 gallon barrel and pour into it 28 gallons of water, into which pour the concentrated solution, stirring thoroughly. It is then ready for use and the

barrel will have enough empty space (20 gallons) to accommodate quite a number of potatoes without overrunning.

"The seed potatoes may be suspended in gunny sacks in the barrel and removed after soaking four hours, when their space can be supplied by others. Perhaps a simpler way would be to have two barrels, each provided with a wooden faucet, in order that the solution may be drawn from one to the other when the potatoes have soaked the requisite time. In this case there is no need for sacks, as the tubers can be dumped into the barrel while empty and turned out when the solution is drawn off into the second barrel.

"After removal the potatoes should of course be dried before cutting. If desired they may be cut before soaking, though the reverse is usually the practice. While all this appears to entail some trouble, it will be found well worth the while to take it, since, if persisted in, after a few years' time, the dreaded Scab may be entirely eradicated on any farm. The process cannot be too strongly recommended, though at the same time the closest care must be observed, while handling the solution, in the disposal of the vessels and liquid when the work is over.

"If any soaked seed remain unplanted they should be buried and care taken that mules do not nibble at the cut tubers in the field during the planting. There is no danger, however, of the poison affecting the tubers of the resulting crop.

"In place of corrosive sublimate, a much safer, and almost as effective, preparation—Bordeaux mixture—may be used."

EARLY BLIGHT

Is the next most important fungoid affection. This, like the Scab, is very widely distributed over the country. It confines its attacks, however, to the leaves and stems, but never affects the tubers.

Professor B. T. Galloway, chief of the division of Vegetable Pathology at Washington, in speaking of this disease, writes as follows: "At first the older leaves show grayish-brown spots, the affected parts becoming hard and brittle. The disease progresses rather slowly, the spots gradually becoming larger, especially along the edges of the leaflets. At the end of ten days or two weeks, half of the leaf surface may be brown, withered and brittle, while the rest is of a pale yellow color. Three weeks or a month may elapse before all the leaves succumb, the stems in the meantime remaining green, until they finally perish through lack of nourishment. The tubers stop growing almost as soon as the leaves are attacked, and as a result the crop is practically worthless." At the Georgia Experiment Station it is found that much less than a month is required to 'finish up' an untreated plat after the *Macrosporium* first makes its appearance, especially when the fungus is reinforced by a baking drouth—not that dry weather stimulates the fungus, but because the heat of the sun on the partially defoliated and enfeebled stalks quickly completes what the disease has begun. When there is also a combination of the flea-beetle, the work of destruction is speedy indeed.

"An effective remedy for the *Macrosporium* is spraying with Bordeaux mixture as soon as the plants are well up—that is, some 6 inches high—and continuing at intervals of two weeks up to the first of June. Other preparations have

been used successfully, such as modified Eau Celeste, but Bordeaux mixture appears to be the universally approved application, though sometimes combined with either a soap solution for the benefit of the flea beetle, or with Paris green for other biting insects."

INSECT PESTS.

THE COLORADO POTATO BEETLE.

This pest has not been very troublesome at the South, but we have known several promising crops of potatoes almost entirely destroyed by them. As this rapacious insect breeds at an astonishingly rapid rate, a Canadian entomologist having stated that the progeny from a single pair, if unmolested or destroyed, would in a single season amount to over 60,000,000, the question of their destruction is a serious one.

The parent bug, or beetle, is a fat, roundish insect about one-half inch in length, its scientific name being *Doryphora decem lineata* (or ten-lined Doryphora), so named from the five black stripes on each of its wing covers. Its main color is yellow, resembling the little striped cucumber bug, but much larger and more chunky.

One female potato beetle will lay as many as from 700 to 1,200 eggs, putting them in clusters of from one to two dozen, on the under side of the leaves. These hatch out in a few days, producing dark brown slugs, about the size of a pinhead, which eat and grow rapidly, until in about twenty days they attain the size of the parent, and are very disgusting looking bloated worms or slugs. They then bury themselves in the earth, and in about from ten to twelve days come

forth perfect beetles, ready again to deposit eggs for the next crop. There are said to be three broods each year.

It is almost of no use to try to destroy these pests by picking them off, especially if your patch is a large one. The writer tried this faithfully one season. Armed with a tin bucket and a wooden paddle, he went regularly and faithfully through the patch, day after day, tapping the vines, knocking slugs and bugs into the bucket, and scalding them to death finally with hot water. But the bugs were too many for us, and we were driven to find some other mode of extermination.

An application of arsenic is the remedy. At first this was done by mixing Paris green or London purple with flour or plaster of Paris, applying it dry when the dew was on the vines, but of late years, since spraying has come so much into use, and is so effective, it is found that a solution of Paris green or London purple, 1 pound to 200 gallons of water, kills them readily. Of course, a second and perhaps three or four sprayings may be found necessary to rid the crop of the second and third generations, which come from the eggs and the buried pupæ.

One thing is favorable, the insects are not great travelers; when they get in a patch they usually stay there as long as there is anything left to eat, so that you are not as likely to be troubled with bugs from your neighbor's field, as you would be if they were of a more roving disposition.

Vigilance is the price of success, however, in growing potatoes whenever the Colorado potato beetle puts in an appearance. Vines should be watched closely every few days, whenever this pest is known to be in the neighborhood, as your crop may be nearly half eaten up in a week or ten days, before you dream of any damage being done, if you

neglect to watch. If only a few appear, knock them out on the first round; spray all the infested vines at once, or the slugs will be grown and down in the ground ready to be the progenitors of the countless millions of the future, before you get to work. Rest assured, if you do not fight these pests vigorously, you will have no potatoes; no, not even vines. They will be eaten off down to the ground.

THE FLEA BEETLE.—*Haltica cucumeris*.

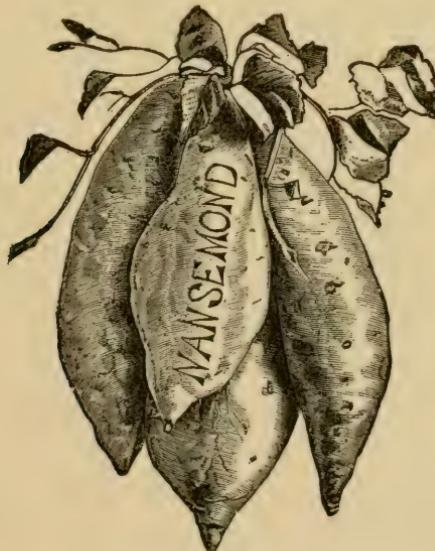
This article upon the flea beetle is taken from Georgia Bulletin No. 29, written by Professor H. N. Starnes.

"This insect is quite small, its length being about one-sixteenth of an inch long—no larger than a good sized flea—which it also resembles in the extreme enlargement of its hind legs, and its capacity to leap with such agility and power that, like its namesake, it is difficult to locate. It feeds on the foliage of other cultivated plants besides the potato, notably cucumbers, from which it derives its scientific name. Much of the damage ascribed to the *Macrosporium* fungus may perhaps be properly charged to the flea beetle, which sometimes drills the leaves so full of holes that they are very nearly 'all hole and no leaf.' Fortunately, however, it is not so prevalent North as South. For a long while it was difficult to combat it, as neither arsenites, buhach, hellebore, nor any other common insecticide seemed to avail. Professor S. A. Beach, of the New York Geneva Station, first demonstrated that the use of hard soap in solution with Bordeaux mixture would successfully resist their inroads by forming a thin film or coating over the leaf, which would remain for weeks, or until renewed. Six pounds of soap to the barrel (50 gallons.) is the proper proportion. The soap should be mixed with a

sufficiency of hot water to thoroughly dissolve it, and the soap solution so obtained, used to fill up the barrel during the process of Bordeaux manufacture detailed under a previous head. In this way the sprayings made for early blight will prove, with little additional cost, a preventive for the flea-beetle, if it chances to be prevalent."

SWEET POTATOES.

Almost everybody knows how to raise sweet potatoes, but a few hints may be acceptable.



To raise the "slips," select a sunny piece of ground, sheltered from north and west winds by buildings or fences; here make beds 4 feet wide sloping them a little to the south digging them thoroughly and working in plenty of well-rotted manure. It is best to box the edges with 6 to 10 inch boards to prevent washing of the soil. On these beds lay smooth unbruised potatoes, side by side, an inch or so apart over

the entire bed; cover with 3 or 4 inches of fine soil and water them frequently until the sprouts are well grown. The bed should be prepared the last of February or first of March. From 5 to 10 bushels will furnish enough slips to plant an acre, some varieties furnishing more sets than others. Remove the slips from the beds by pressing down the earth over the potatoes with one hand, pulling off the sprouts with the other, so as not to disturb the fibrous roots, as the parent potato will continue to furnish slips for several months if not disturbed.

These seed beds should be protected from frosts and hard freezes, by covers of glass, or by frames with cotton cloth tacked upon them, these covers being removed when the sun shines and the air is warm.

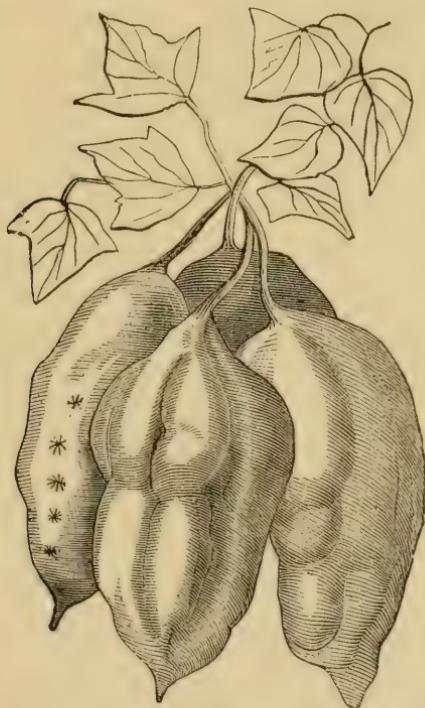
Not only can slips or sets be taken from the seed beds, but can be cut from the plants after they have been set out in the fields and are well established, say in four to six weeks after they have been transplanted from the seed beds. These plants are fully as productive and do as well as the original plants.

A sandy or sandy loam soil is best for sweet potatoes, the ground moderately rich. Deep plowing and thorough pulverization of the soil is necessary, and the ground should be laid off in ridges, the crowns of which should be $3\frac{1}{2}$ feet apart. It is customary to run these ridges north and south, and this is probably the best arrangement unless the natural drainage of the land favors some other direction.

The plants are set in holes made with a sharpened stick, or "dibble," 18 inches apart in the top of the ridges, and if set in the cool of the evening, very few plants fail to grow.

They should be well worked when young to keep down

weeds and stimulate their growth, working the rows broad, rather than high and pointed. Let the last working be deep and thorough but not too near the plants, laying the vines over upon themselves on either side out of the way of the plow. Care should be taken not to cover the vines with soil,



BERMUDA SWEET POTATO.

so that the strength of the plants shall go to the main roots and potatoes, not to suckers. Wood ashes, supplying potash, and the phosphates, are the best manures for this plant.

Two crops can be grown the same year, if slips for the early crop are grown in a hotbed, and the plants set in the field just as soon as all danger of frost is over. If only one

crop is grown this can be planted to good advantage after a crop of winter oats is harvested. The crop of potatoes should average 300 bushels per acre, worth \$150, and the oats \$20, or \$170 for one year's crops.

The best known and approved sorts are the Yellow Nansesmond, known also as the Early Carolina or Jersey Yellow, which is the most popular market variety, and the Bermuda (white and red) which grows very large, and is very vigorous and productive.

(W. F. M.) "The sweet potato crop for the early market is one of the crops that will pay well to use glass in the forwarding of the plants. In order to have good strong plants at the earliest moment that it will be advisable to set them in the open ground, it is necessary to protect the plants during their earlier stages. This, of course, can be done in a measure by covering the beds with pine straw, but where one is provided, as every market gardener should be, with frames and sashes, it is far more certain and convenient to grow the plants under the sashes. In bedding the potatoes under glass no manure is needed, as we prefer to bed in pure sand. We thus avoid largely the 'black shank fungus' that is often so destructive in manure heated beds. A thick bed of sand, or very sandy soil, is placed in the frames and on this the potatoes are bedded in the usual manner and covered with an inch or more of the same. This should be done about the first of March. The sashes are at once put on and kept closed until there are signs of sprouting, when air must be given on sunny days and the bed kept regularly watered. By this means it is easy to have the plants as early as it is safe to put them out. Care must be taken as the weather grows warmer, to expose the plants at all proper times to

the full open air, so as to get them hardened off ready for transplanting

"The sweet potato is one of the plants with which shallow plowing is far better than deep. Nearly all of our growers here make their hills too high and thus get long, crooked and unsalable potatoes in the Northern markets, where a short, chunky potato is demanded. To grow these we must have the land plowed shallow, and the ridges also shallow. The best manure is the black mold from pine woods mixed with the pine straw and piled up the fall before in large heaps and mixed with lime. This is spread broadcast in the spring and plowed in. If then cross plowed to mix it more perfectly all the better. Then, in running out the furrows for making the lists, we scatter in the furrow 300 pounds per acre of a mixture of 600 pounds of acid phosphate and 200 pounds of muriate of potash; make a two-furrow list over this and flatten slightly for planting. Nitrogenous manures should be avoided as tending rather to a ranker growth of tops. The woods-mold and lime compost will furnish all the nitrogen needed, and the liberal percentage of potash will prevent any harm from excessive stimulation. An ordinary cultivator is the best tool for the greater part of the cultivation, and the laying by should be done with the ordinary tools used in the cotton crop, for the hillings generally given cotton is plenty for sweet potatoes. In setting out the plants we draw them carefully from the bed so as not to disturb the tubers and set them at once in tubs of water. They are set from these tubs dripping with water, and the roots puddle themselves in the soil so that after-watering is seldom needed. These early plants are entirely for the early crop for shipping. A late crop for home use

and for seed is grown by taking good sized cuttings and setting them in ridges in July and August. Potatoes grown from these cuttings of the vines will keep far better in winter than those grown from the spring plants. Where these late potatoes are wanted only for bedding purposes a large crop of small roots can be grown by making the cuttings a yard long, coiling them around the hand and planting the whole coil, leaving only the tip exposed."

CABBAGES.

TWO CROPS PER ANNUM.

Cabbages can be just as successfully grown in the South as in Ohio or New York; the only difference being that here you can grow two crops in the year, there but one. "How can it be done?" Sow your seed early in December in boxes in the house, in the greenhouse, or in glass covered hotbeds, or in "cold frames" with covers made with cotton cloth tacked on slat frames, which will usually be sufficient to keep off frosts, but which must be supplemented during hard freezes with extra covers of matting, gunny sacks or old carpeting.

These beds should be in some warm corner, on the south side of buildings or fences, where they will be protected from cold winds. The plants will be ready to set out (if they have been watered and tended well by giving them plenty of air and sunlight so that they have not grown spindling and "drawn") the first to 10th of March. If, however, it is desired to have earlier plants, sow the seeds in October or November (in poorer soil than in December) and when grown large enough to set out, transplant them into another bed or cold frame in poor soil, putting them close together to stand

over winter, giving them all the cold air possible night and day, only covering them during hard freezes through the winter.

The best very early variety we consider the Jersey Wakefield, though some prefer the Winningstadt. Cabbages will do well only on good rich clay or loam soil, with clay subsoil, and should be heavily manured with the best of well rotted manure, cow manure being preferable. Applications of lime and salt the previous fall and winter are beneficial, tending to destroy and keep off cutworms, and also to act chemically upon the manures, rendering them more easy of assimilation by the plants.

It is highly important that the ground be worked deeply, either with spade or fork if in the garden, or with plow and subsoil plow if in the field, before setting the plants.

The Jersey Wakefield variety can be set 16 or 18 inches apart, while the larger and later sorts, such as Flat Dutch, Drumhead, Fottler's Brunswick, etc., should be set not less than 2 feet, and all plants of the cabbage family should be set in the ground up to the first leaf, no matter how long the stem may be, and the earth pressed tightly about the root. Setting the plant deep is one of the most important points in cabbage culture; they will not head otherwise.

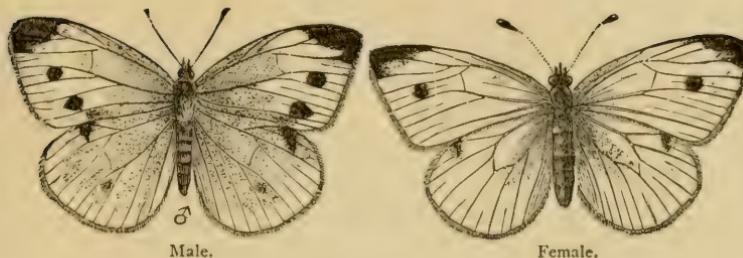
Another important point is to work the ground frequently, especially when it is damp, early in the morning or after a rain.

For the second crop, sow the seed in August in a bed on the north side of a building or fence, watering the bed regularly, and setting out as soon as the plants are large enough; work them well and frequently, as directed above,

and the crop will be ready for market before cold weather comes in the winter.

A good crop of beans or of some other quick growing vegetable can be grown on the same ground, between the time of gathering the early cabbages and planting the late ones. The early crop of cabbages should be ready to cut from the first to the middle of June, and the late crop should be planted about the 1st of October, and will be ready for use in January.

Cutworms are pretty sure to trouble cabbage growers early in the spring, eating the plants in the night and burying themselves in the soil near the stems in the daytime. They must be dug out and killed; a small stick or a large nail are good tools to do this with (the cut leaves or stems will show where the worms are). The patch should be "wormed" every few days, but if it is a large one the remedy proposed by Professor McCarthy should be used, namely, "to spray Paris green upon green, succulent vegetation of any kind, especially clover and cabbage leaves, dust upon these some wheat flour and roll the leaves in a ball, and tie. Prepare the field at least a week before planting, and distribute the poison balls throughout the field, say 10 feet apart; the worms coming to the surface and finding no growing plants will cut the poisoned baits. The bait must be renewed when withered. A shingle may be placed upon each ball to keep it moist." Later the *green* worms will appear, generally lying along the central ribs of the leaves, and these must be picked off, or otherwise destroyed, or they will eat up your cabbages.



IMPORTED CABBAGE WORM BUTTERFLY.

These are known as the *imported cabbage worm*. We give engravings of these pests. They are well known to almost everybody. The butterflies are usually white, but sometimes a pale yellow, with dark markings on the upper sides of the wings. The eggs are laid in groups of twenty or thirty on



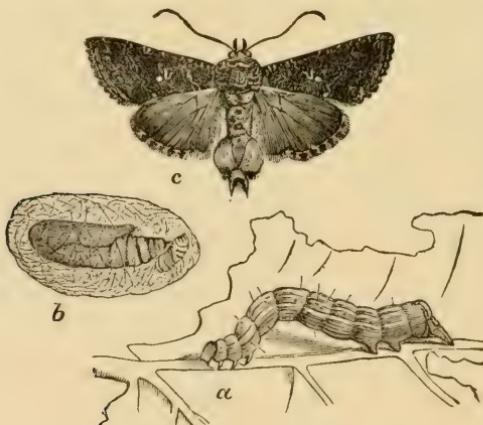
a, Worm; *b*, Chrysalis.

WORM AND CHRYSALIS OF IMPORTED CABBAGE WORM BUTTERFLY.

the under side of the cabbage leaves, and hatch in about a week, and when fully grown the worm is about $1\frac{1}{4}$ inches long. It lies usually along the central rib of the leaf in the daytime, eating away the sides of the leaves at night.

CABBAGE PLUSIA.

Another enemy of the cabbage grower is the cabbage plusia. The caterpillar is pale green in color and marked with light longitudinal stripes, and is very voracious, eating into the very hearts of the cabbages. The moth is of a dark gray color, marked as shown in the engraving below. It usually flies at night.



a, Worm; *b*, Chrysalis in cocoon; *c*, Moth.

CABBAGE PLUSIA.

For these and other cabbage worms spraying with a strong tobacco solution is an effectual remedy; that made from tobacco stems will answer the purpose admirably.

Another remedy is pyrethrum powder, either used dry or in water applied with a spray pump. If used dry, dust it on in the early morning while the dew is on the plants, but the easiest way in a large patch is to spray it on.

HARLEQUIN CABBAGE BUG.

In the later part of the season the Harlequin cabbage bugs are likely to appear, and although at first they may

seem to be insignificant, yet very soon their numbers will increase rapidly, and they will prove very destructive, eating the outside tissue of the leaves and making the young cabbages appear white and blasted.

This insect is about half an inch long, a fat little bug, black, marked with red and yellow. There are several broods in a season, so they should be fought on first appearance, and will generally be found on mustard and radish plants, before the cabbages are large enough for their attack.

It is well, therefore, to sow these plants on ground designed for cabbages and destroy the young bugs just as soon as they appear, by spraying the plants with a *strong* emulsion of kerosene.

As long as there are plenty of mustard or radish plants for them to eat, they will not disturb the cabbages. But they must be fought vigorously while young, as the old, full grown bugs are hard to kill even with kerosene emulsion.

A few broods of young chickens are good things to have near a cabbage patch. Applications of dry wood ashes and a little Paris green mixed, are recommended to kill worms on *young* cabbages, but this should only be applied *before they begin to head at all*. It should not be used on cabbages that are heading, as it might lodge and be retained in the head. Paris green, as is well known, is an arsenical preparation, and a deadly poison. Water heated to 120 degrees (no hotter) can be used on cabbages to kill worms or lice, and does not usually injure the plants.

Keep sufficient plants back in your seed beds to reset where any have failed to live, or been eaten off by cutworms.

Remember, then, if you please, the main points in cabbage growing in the South are:

Rich soil deeply worked.

Early plants or very late ones.

Deep setting.

Firm packing of the soil about the roots of the young plants.

Frequent workings, especially when the ground is damp.

Worms and bugs well fought and destroyed.

Attention to these points will bring success, and success in cabbages, while it means lots of work, means also lots of money.

Cabbages set 18 inches apart both ways yield 19,341 plants to the acre, or if set 2 feet apart, the product is 10,890 plants; which, if sold at 3 cents each, would give \$580.23 and \$326.70 respectively as the returns of the acre; or if sold at 5 cents each, the snug sums of \$967.05 and \$544.50; and then the fall crop, the second crop on the same ground, would still remain to be heard from. But I think I hear you say this is visionary, purely imaginative. No, my friend, it is not; similar returns to those given above are realized on the cabbage farms of the South, where cabbage planting is made a business of, year after year.

(*W.F.M.*) "The early cabbage crop is one of the greatest importance to the Southern market gardener, and its increased consumption seems to keep pace with the increase in production as well as any other crop grown. Many years ago, when we depended upon Europe for many of our seeds, and the old Early York was the standard early cabbage, there was nothing more uncertain than the heading of an early cabbage. But since we have learned that for American planting home

grown cabbage seeds are essential, and the Early Jersey Wakefield cabbage has been developed, the crop is as reasonably certain as any. There are still in the South some gardeners who imagine that the European grown seeds are the best, and there are dealers who cater to this impression, for the imported seed can be sold much cheaper than the home grown ones. But the gardener who imagines that a very low price for seeds is consistent with good quality will be badly deceived. Seeds from a well bred race, that have been kept pure by long selection, always cost more than carelessly grown seeds, and are worth to the grower many times the difference in the price.

GROWING THE PLANTS.

"Early cabbages are always planted in the fall in the South, and well grown plants at the right time are essential to success. While a good sized plant is necessary at planting time in November, care should be taken not to make the sowing of the seed too early, for if these early plants get a check in their growth they will run to seed in the spring instead of making heads. It is the opinion of experienced gardeners that this running to seed is not so much the result merely of too early sowing, but of a check by drouth or some other cause. The proper time for sowing seed for the early cabbage crop is from September 25 to October 10. In some seasons they may be sown later, but several sowings within these dates will usually give the plants the proper size. We prefer several sowings rather than depend on the results of but one, for the earlier ones in some seasons may not be in as good condition at planting time as those sown later, while,

if an early cold sets in, the earliest ones may be the better ones.

"The careful gardener will also guard against possible loss of plants by making still another sowing of seed in the cold frames in late November, and keep them protected by sashes on cold nights until February, when they will make a useful succession crop to the first planted ones if they do well. This last sowing should be made of a larger growing variety, like Fottler's Brunswick, or Succession, which do not do so well for the early fall sowing. The early fall sowing should be made on a bed of fairly fertile soil, but no manure or fertilizer should be used, as a very rapid growth would make the plants too tender, and a sudden check in this rank growth would throw them into seed making. The soil into which they are to be transplanted later cannot be made too rich, but in the seed bed at this season we want a moderate and sturdy growth, so that the transplanting to a highly enriched soil will be no check to them, and they will be in a better condition to go through the hard weather that January may bring.

"Make up beds for the seed sowing about 4 or 5 feet wide and sow seed in rows across the bed about a foot apart. The seed should be sown thinly so as to give room for stocky growth. The beds can be thrown up with a plow about a week ahead and let lie for the weed seed to germinate, and in raking them level, these weeds will be destroyed and give less trouble thereafter. Those sown in the frames we usually scatter broadcast and transplant, as soon as large enough to handle, about 2 inches apart all over the bed. This will give much better plants than if they were left as sown. If not transplanted the seed should be sown in rows in the frames,

too, but the rows need be but 3 inches apart. There are so many accidents of weather and insects to guard against that the careful gardener will always use a superabundance of seed in preparing for this crop.

"The late Peter Henderson, in his book '*Gardening for Profit*,' estimates an ounce of seed to secure 2,000 plants. Now, there are several times that many seed in an ounce, and even with the best of seed we seldom secure all the plants in good shape that germinate. We must make large allowance for the fall grasshoppers, with their enormous appetites, and the reverses of the weather. So the amount of seed advised by Mr. Henderson is, in our experience, not far from right for safety. We have sometimes lost every seed, of an entire sowing, from no fault whatever in the seed, but from insects and unfavorable weather. A baking rain should be at once followed by a loosening of the soil in the bed, whether the seeds are up or not.

THE SOIL AND ITS PREPARATION.

"In the first place let it be well understood that the soil for early cabbages cannot be too rich. The plants are gross feeders, particularly of nitrogenous manures, and a continuous and rapid growth is essential to earliness and a good crop. Land freshly cleared from a forest growth, no matter how fertile it may be naturally, nor how well manured it may be, will not grow the best crop of early cabbage. It needs years of culture in vegetable crops to fit the soil for the best results in cabbage growing. The best soil for the early cabbage crop is a high, mellow loam, inclining rather more to clay than too sandy, but quite a sandy soil will make good crops if the clay subsoil is not too far away. Such land may be

quite thin at first, but it can be more rapidly brought into good condition for this crop than the deep, black soils of a lower lying land. These lands are bad for wintering the plants and make soft headed cabbage. But no matter how fertile you may have gotten your uplands, it will never do to assume that you can grow a good crop of early cabbage without further heavy dressings. Other crops may at times make their growth in what the previous crop has left in the soil, but early cabbage never. While in case of necessity cabbage may be grown, by heavy manuring, in the same land that grew the same crop the year before, it is always best to rotate the crops and not plant the same land two years in succession if it can be avoided.

"We have never yet been able to discover the limit to which manuring may be profitably carried with this crop. The use of lime as the soil gets well supplied with vegetable matter is an important matter in the cultivation of the cabbage crop. It should be applied about once in five years, at the rate of 50 bushels per acre. If the soil has a clay bottom it should be deeply broken by the subsoil plow whenever the land comes in cabbage. The more lavish the manuring and the better the previous preparation, the better always the crop.

TRANSPLANTING.

"In drawing the plants from the seed bed in November they should be at once placed in tubs containing enough water to cover the roots, in which they should be taken to the field, and set while dripping wet. We prefer to run the rows east and west, put most of the fertilizer in the laying-off furrows and bed on them. Then set the plants near the base of the bed on the south side. The plants should be set so

firmly in the soil that the tip of a leaf will break off before the plant can be pulled out by taking hold of the edges of the leaf, and they should be set well in the ground so as to cover the entire stem, which is the most tender part. The beds should be from $2\frac{1}{2}$ to 3 feet apart, and the plants about 15 inches apart in the row. When plants are plenty it is a good plan to set them half this distance apart, to guard against accidents during the winter, and in spring cut out the surplus plants to dispose of for greens, when the other plants need all the room.

CULTIVATION.

"No plant that the gardener grows requires more rapid and thorough culture than the cabbage. The plants being set during November will not need any cultivation until they begin to grow strongly in February. As soon as the growth begins the rows should be barred off with a small plow and the soil at once leveled with the cultivator. The cultivator should then be used once or twice and the cultivation completed with the plow by bedding the soil back to the plants. I have found it of great benefit at the 'laying-by' cultivation to run a plow without moldboard deeply through the center of the middles. A light subsoil plow or a common bull-tongue will answer. The remainder of the fertilizer should be used alongside the rows in barring off, to be covered by subsequent cultivation.

HARVESTING AND SHIPPING.

"A light, sharp hatchet is the best tool for cutting cabbages. The shipping should begin as soon as the hearts of the cabbages are firm and solid. A few of the outer leaves should be left on, so as to make them pack nicely in the bar-

rels. Ventilated barrels are generally preferred for shipping, but large crates holding a barrel are coming more and more into use for cabbages and a few other crops. Our growers think that a small-headed Jersey Wakefield, that will take nearly seventy-five heads to a barrel, makes a more profitable shipping cabbage than the larger Charleston Wakefield, that will fill a barrel with fifty heads. The Succession and Fottler's Brunswick will fill a barrel with eighteen or twenty heads.

"The packing should be done as firmly as possible, so that there should be no material shrinking in transit. Put heads of same average size in each barrel, cover with bagging and mark the number of heads in each. When the cabbage crop is off, the gardener who has the increasing fertility of the soil in view will at once plow in a good sowing of cow-peas on the land, to be cut later, with the crab grass that will inevitably spring up among them, for hay to feed the stock, for stock of some kind should always be kept on a truck farm to profitably use up the refuse from the crops and to furnish manure.

VARIETIES.

"The earliest cabbages are invariably of the conical headed class. The introduction of the Jersey Wakefield marked an era in early cabbage culture in this country, and soon caused the old Early York to be abandoned by all progressive truckers. The great fault of the Wakefield has been a lack of uniformity of type. When we first began to grow this cabbage, twenty-five years ago, the best samples would give many round heads that were always later and reduced the value of the crop materially, and delayed the subsequent use of the land. Now, after years of careful selection, we have various strains of Wakefield and other conical headed

sorts that are uniform in type and far more valuable than the original Wakefield. The largest heading of these is the one known as the Charleston. This comes very true to type and is of good size, but it is later than the small type.

"Of the smaller type of conical headed cabbages there are two that have become favorites with the market gardeners of the South. These are Tait's Extra Early and Tait's Extra Early Pilot. The first has long been largely grown around Norfolk, but the last is a more recent introduction. It is, in our experience, the best of the early cabbages for our use, as many more can be planted on an acre than of others, owing to its slim, upright growth, and it is of the size that has been found to sell best in barrels. The Winingstadt was long a favorite with us when the Wakefield was so badly mixed, but it has the disadvantage of making such wide spreading leaves that fewer can be grown on an acre. The heads are remarkably solid, and while at the North it is stated to be much later than the Wakefield, we have not found much difference between them and the ordinary type of Wakefield in this respect in the South. We have often commenced to cut both the same day. But it is later than the two sorts last named, which we consider the ideal early cabbages.

"Of the flat headed second early type there is little choice between Fottler's Improved Brunswick and Succession. Both are fine and very sure to head. If there is any difference we would give preference to Succession. These varieties should never be sown in the early fall, when the early sorts are sown, as they will be apt to run to seed. Sow them in cold frames in November and transplant for wintering in the frames.

LATE CABBAGE.

"The crop of late cabbage is a far more difficult one to grow in the South than the early crop. The climate in summer, and the multitude of various insects, together with the diseases that infect it, make the culture of the late fall and winter crop a matter of much uncertainty in all the eastern plain country of the South Atlantic slope. In the western mountain region of this State the soils and climate are peculiarly well adapted to this crop, and it has assumed great importance there as a crop to ship to the coast cities of the South.

"The great difficulty in the culture of late cabbages in the South has been, we think, that growers in the warm coast regions have followed too closely the practices that are found best in the North, but which are not best in our climate. While it is extremely difficult here to have cabbages to head in the early fall, it is much more easy to have a good late winter supply, if the proper conditions are observed. Most people sow the seed of their late cabbage too early, and then have to keep them through the long summer. If the plants sown in the spring survive at all, they are in such a stunted state that no good cabbages can be made from them. In the mountain country, the common Northern modes of sowing and culture are all right, but in all the warmer sections we must adopt a different plan. Here seed for late cabbages should not be sown before the 1st of August. While in sowing seed for the early crop in the fall, it is desirable not to have the seed bed too rich, the opposite must be the case with those for winter heads. The seed bed should be away from the farm buildings, as insects are more troublesome there. A good plan is to burn over a bed, just

as it is done for tobacco plants, and then manure it heavily. The seeds are to be sown in rows, and encouraged to grow as rapidly as possible. Dusting the plants as soon as they appear with tobacco dust and air-slaked lime we have found to be the best means to ward off the 'flea-beetle.'

"The plants should be planted in a naturally moist, clayey soil, made as rich as possible. Cultivation should be rapid and thorough, and every means should be used to keep the plants growing as fast as possible. As it is important that they should begin to turn in for heading early in November, a dressing of nitrate of soda alongside the rows will be useful. Then early in December they will be well headed. If they are then bent down where they grew, with the heads turned toward the north, and the soil is well banked over the stalk and the base of the head, they will keep well.

"For this crop we prefer to use Fottler's Brunswick and premium flat Dutch. The first named will head earlier, and the last will keep longer. Constant care will be needed with this crop to keep insects in check.

"For the common 'green worm,' the larvæ of the cabbage Plusia and Pieris butterflies, the best remedy we have tried is a mixture of salt and air-slaked lime in equal parts sprinkled over the plants. If a dressing of nitrate of soda is applied alongside the rows in cultivating, the growth will be so much encouraged that the plants will, in a measure, outstrip the worm. The harlequin or terrapin bug can be destroyed by kerosene emulsion in almost full strength, but it is a severe dose for the plants, and hand picking is best on a small scale. Or a row of mustard may be sown between the rows, and the bugs will leave the cabbage for the mustard, when they can be destroyed with pure kerosene.

Winter cabbages always find a ready sale in our home markets, and might be made a profitable adjunct to the garden."

ONIONS.

Twenty-five years ago these vegetables were grown at the South almost exclusively from "button" onions, or from "sets," small onions, about the size of a swallow's egg, both of which were imported from the North.

We have found it to be just as easy to raise fine, large onions from the seed as from sets or buttons, and that if seed or sets are wanted they can be grown here just as well as at the North.

Let the ground be well plowed or spaded and enriched—there is no danger of getting it too rich, provided the manure is well rotted—then harrow and roll with a light roller. Applications of ashes, salt, lime, bone dust and gypsum or sulphur will supply nearly all the chemical elements this crop requires.

Peruvian guano (which is much richer in phosphates and nitrates than the droppings from domestic poultry), mixed with pulverized charcoal and bone meal is highly recommended, but we have found no difficulty on good rich clay or loam soil fertilized with well rotted cow manure and chips and sawdust from the woodpile, with some ashes, in growing crops of fine, large onions, both from seed and sets, without using any of the more expensive fertilizers enumerated above.

Plant or sow in February or March, as soon as the weather will permit, putting the rows 12 to 15 inches apart. If buttons or sets, put them from 4 to 6 inches apart in the rows, or if seeds are sown drop them about an inch apart.

When as large as pipe stems thin out to 3 or 4 inches apart, transplanting those pulled out to other beds.

The Arkansas Agricultural Experiment Station finds that transplanted onions yield about 15 per cent more of marketable size than those not transplanted. It will be well, therefore, to have other ground ready on which to set the surplus plants.

Be sure your seeds are fresh; old onion seed will not vegetate. Test them by sprouting a few, keeping them damp in a shallow dish set in a warm place. If good they should show sprouts in thirty-six to forty-eight hours. Buy your seeds only of reliable seedsmen. In fact, buy all your seeds of such parties, you will find their advertisements in the back part of this book.

Never sow onion seeds broadcast, as they cannot then be properly hoed.

If you intend to work onions with plow or cultivator, the rows must be 2 feet apart, but for hoe culture 12 to 15 inches is enough. The best hoe is one that has a long, narrow blade, not more than 2 inches wide, running to a point at one end, the other having a chopping edge, the handle being in the middle. Such a tool as this is invaluable in onion culture, for working up close to the rows; the middles can be worked out with plow or cultivator or a common broad bladed hoe. Do not work onions deep, do not cut away the side roots.

Onions should not have the earth hilled up about them; work it away rather than towards the plants; they are said to grow larger and keep better thus.

It is easy to keep a large onion patch clean with hoes of the pattern described, but grass and weeds in the rows must be pulled out by hand.

Onions can be grown year after year on the same ground and the crop does not deteriorate. They have been successfully grown in Europe for over 100 years on the same land every season. Of course if this is done, the strength of the soil must be kept up by applications of fertilizers.

We have found the Yellow Globe Danvers onion a very satisfactory sort, but the large Red Globe is also a strong grower and produces and keeps well.

We prefer the globe shape to the flat, as they are better keepers and with us produce larger crops.

The onion is an easy plant to raise from the seed if the ground is made rich, they are sowed early, worked and weeded well, and given plenty of room in the rows; from a late sowing it is almost impossible to get a stand. In hot weather the seeds, although fresh, are hard to germinate.

To raise seed, set out either in the spring or fall some of the largest and best onions of the black seed varieties and harvest the seed when they begin to turn black in the pods, when they should be carefully dried.

By planting "button" varieties you get buttons on the top of the seed stalks in place of seed.

To raise "sets," sow black seed thickly in rows 4 to 6 inches wide, rows 1 foot apart, in poor soil; work a little between the rows, but let the onions grow thick together, weeds and all, and they will be stunted and small, and should be kept when harvested in some dry place where they will not freeze, and will be as good for late fall or early spring setting as any Northern grown sets. From 4 to 5 pounds of

black seed are required to sow an acre, and of the buttons or sets from 8 to 12 bushels, depending on their size.

From 300 to 600 bushels of onions per acre of the black seed variety are the usual crop. At say 450 bushels to the acre, and raised at a cost of about \$25 and the crop sold at only 50 cents per bushel, \$200 net per acre is gained, which is a good return. It is said that by sowing the seed in a hot-bed in January and transplanting when the plants are as large as pipe stems, a much earlier crop can be had and the yield is found to be increased.

TO KEEP ONIONS THROUGH THE WINTER.

It is a little more difficult to keep onions after they are ripe, at the South than at the North, but with proper care they keep perfectly. If spread on a floor, even in thin layers, they are apt to rot.

We have found the best method to be to tie them in bunches of about a dozen, and hang them on nails in a shady and airy place in an open shed or barn. Keep them there until the weather begins to get cold then cut off the tops and put them in large paper bags, leaving out any that are soft or sprouting; the bags should then be hung up in a *dry, cool*, frost proof cellar, or fruit house, such as we have described on another page.

We should advise, however, to get your onions into market as early as possible; as soon as you can get a good price for them sell them, as a dollar a bushel in the summer or fall is a much better price than the same rate in the winter or the next spring. The waste from drying out, rotting and sprouting, will inevitably be considerable, either at the North or the South.

(W. F. M.) "When well grown on suitable soil there is no garden crop that promises more benefit to the Southern market grower than onions. Either for shipping bunched when half grown or as an early ripened crop they are very profitable. Formerly, the impression was general in the South that onions could not be grown to full size in our climate the first season from the seed, and that it was essential to use sets of the previous year's growth for planting the crop. This is now demonstrated to be an error, for as good onions can be grown in the South the first year from the seed as can be grown anywhere, provided the seed are sown early enough. But for the early crop for bunching green in March we are satisfied that it is better to plant sets in the fall. If we could always be sure of growing weather in the early fall as good results could be had from sowing the seed in September or October. But the weather is so apt at that time to be dry and unfavorable to germination that sets are far more certain. But for a crop of ripe onions we can always produce a better crop from the seed than from sets.

"Onions, like sweet potatoes, can be grown year after year on the same land, provided it is kept heavily fertilized with stable manures, but if only commercial fertilizers are used, an occasional crop of peas turned under between crops will be needed to keep the soil supplied with the humus essential to the success of the onion crop. In the North the onion crop is largely grown on the peaty soils of reclaimed swamp lands, but for the early crop in the South we should select higher and dryer soil. A loam more inclined to sand than clay is best, and the best crops cannot be had until the land has been cultivated in the crop and well manured for several years. No crop suffers more readily from lack of

cultivation than the onion. The plants will not thrive among weeds and grass, so that 'clean as an onion bed' has grown into a proverb.

"We will speak first of the fall planting of sets for the green onion crop. The soil should be in the finest possible order, and furrows run as closely as will admit of mule culture. In these furrows the fertilizer is scattered, a high grade article, at the rate of not less than 1,000 pounds per acre. Two furrows are then lapped over the first ones, and the ridges thus made are flattened by a roller or chopped down with a hoe. On the flattened bed thus made a line should be stretched, by which a shallow mark should be made for planting. The sets are then planted by hand on this mark, and just barely inserted in the soil. The bedding is important as it puts the fertilizer just where wanted and the slight elevation above the general surface is a protection from winter rains. It also enables us to cultivate more readily with horse power among the small plants. The planting should be done in October, and little need be done, except to keep the plants clean, till cold weather sets in, and to cultivate well as soon as growth fairly begins in February. This crop should be ready to ship in March, tied in bunches of five or more, and packed in barrels, with most of the tops left on. As soon as they are off, the land can be put in order for the crop of snaps, which can be followed by peas, to be cut for hay, and prepare the soil for the next fall crop of onions. Grown in this way, the manure applied to the onions will carry the other crops, and the soil will be accumulating humus from the bean vines and the pea stubble, and no stable manure being used there will be annually fewer weeds.

THE CROP FROM SEEDS.

"There are two methods of growing onions from the seed the same season. One is to sow the seed in frames in January and transplant the young plants later on. The other is to sow the seed where the plants are to grow in February. Some varieties of onions will make a much heavier crop by being sown under glass and transplanted, while with other sorts it is of no particular advantage, except in earliness. The sorts mainly benefited by this practice are the Italian and Spanish varieties. Though apparently a laborious method, it is little more so than the thinning of the crop grown in the open air. The variety best adapted to this method of culture is the large pale yellow sort known as the Prize Taker. This fine onion will produce superb crops when grown in this way. The seed are sown quite thickly in the frames, and when well hardened are dibbled in rows marked on heavily manured and flattened ridges as heretofore advised for other plants.

"There is no difficulty whatever in transplanting young onion plants. The same character of soil and the same fertilization advised for the fall crop will answer for this crop. The only difference between this crop and that from seed direct in the open ground is that the seed are sown in this case at the time the plants would be transplanted. For most sorts we rather prefer in this climate to sow the seeds where they are to grow. If this is done as early as the ground can be worked in the spring the crop is as certain as any other vegetable. Plenty of seed should be used to secure a full stand, and they should be carefully thinned, so as to give room for full development of the bulbs. The great advantage in sowing on a slightly elevated ridge is that the crop can be

easily worked by horse power, and it is easy in laying by the crop to work the soil away from the bulbs, for the onions should mature on top and not in the ground.

"The mature crop of onions in the South should be shipped as soon as ripe, so as to get into the market before the Northern crop does, and thereby command a better price. Few varieties grown here can be relied upon to keep well, though some will do so, and these sorts can be profitably grown for the home market, and better prices usually be had than for those that are shipped, to a limited extent.

VARIETIES.

"The varieties of onions are very numerous. The earliest are the Italian sorts and the Spanish onions usually grown in Bermuda and sold as the Bermuda onion. The earliest onion of fair size is the Queen. The ordinary stock of the Queen is by no means a large onion, but there are special strains of the Queen that attain a very good size. Tait's Extra Early Queen we have found to be a fine strain, very early and of fair size. It is a beautiful white flattish onion, but not as flat as the Bermuda. We have never been able to see any difference between this and the sort that has been of late years sold under the name of Pearl, and we believe the Pearl is only the Queen under another name. The Prize Taker is a very large, globular, yellow onion that has become quite popular of late. It certainly makes fine crops under good culture and is the best of all for starting under glass and transplanting. It is one of the most salable of onions and should be largely grown. It will not keep when grown South. Giant Rocca is a very large late onion of a reddish brown color. It is one of the Italian sorts, and though

a big cropper we do not consider it very valuable. It is, however, a better keeper than most of the Italians. For a good cropper and a handsome globe-shaped onion, as well as the best of keepers, we have found the Southport White Globe unsurpassed. The bulbs are as sound and solid as a baseball, and they keep perfectly, even when grown in this climate. We have by no means exhausted the list of varieties, but these comprise the most valuable. The Queen will be found best for the fall crop from sets or for the earliest crop from spring sown seeds. The Potato onion or Multiplier is always grown from fall planted sets, as it does not make seeds. There are two varieties, the white and the yellow. The white sort is now much planted for early green bunching onions and both are used for an early ripe onion. The yellow sort is a very poor keeper and must be sold as soon as ripe; the white keeps a little better. The White Potato onion promises to be one of the very best for the early bunching crop.

GROWING ONION SETS.

"For growing sets the soil must not be so rich as for growing the onion crop and the sowing should not be so early, the object being to get as small well matured sets as possible. The seed are sown in drills in April in light, mellow soil and very thickly, not less than 20 pounds of seed per acre. As soon as ripe they are taken up and cured with the tops adhering to them, and kept with the tops attached till selling or planting time. Sets of the Queen must be planted in the fall, as they will not keep for spring planting. Seed for growing sets should be home grown, or at least not grown north of Philadelphia, as seed grown in the far North will not make good sets."

ASPARAGUS.

This vegetable is an excellent shipping product and is produced in the South of fine size and flavor, and can be made here in every respect a commercial success, with as little expense and trouble as anywhere in the United States.

Plants are grown from seed, or can be obtained from any nurseryman, ready to set out in permanent beds. The beds should not be more than 4 feet wide so that trampling upon them may be avoided.

Previous to making the beds the ground should be worked deeply, either by plowing, both with turning and sub-soil plows, or by digging and trenching, filling the trenches with an *ample* supply of well rotted manure. A large amount of fertilizing material is all important in asparagus raising, as the beds once established last twenty or thirty years, and the vigor of the plants and size of the edible shoots depend greatly upon the richness of the soil. A shady place is to be avoided, as the plant likes the sunshine, and comes earlier where the location is sheltered, warm and sunny. Forty-six inches will be found a convenient width for beds, with a path 36 inches wide between them. Set the plants 8 inches from the outside edge of the bed, 12 inches apart in the rows, and let the rows be 15 inches apart. The crown of the plant should be set so it will be covered 2 inches deep with earth.

Give the beds a good, heavy top dressing of well rotted manure each fall, after cutting off the dead canes, and in the spring sprinkle with salt or pour on brine, which will tend to keep down weeds, and is beneficial to the plant.

In marketing, cut the shoots off when 6 or 8 inches long, having them of uniform length, tie them in bundles 3 inches

in diameter, and pack in the ordinary one-third bushel cases, such as peaches are shipped in. There is an almost unlimited market for early asparagus in Northern markets, as it comes in before any other vegetables, unless it may be onions, or hotbed products; in fact the growing of asparagus in hotbeds or cold frames will pay admirably, as it can then be got into market fully a month earlier than by open air culture. An acre in asparagus, well set and manured, would help many a poor man to lift a mortgage, or build a fine, new barn, or a young man to get money enough to take him through college. The shipping facilities, however (by express or fast freight), must be good.

When once established, an asparagus bed is good for almost, if not quite, an ordinary lifetime, and will be a continual and sure crop, costing almost nothing for the yearly care given it.

We have found it a good plan to put a boxing of 6 or 8 inch plank about the beds, as this keeps the manure which is given them each fall from being washed away by heavy winter and spring rains. This, of course, can be omitted in field culture.

An ideal soil for asparagus is a deep, rich, sandy loam, which should, however, be still more enriched as above. In field culture single rows are best, giving plenty of room for working with the plow, and the more room the roots have and the richer the soil is made, the stronger the plants will grow, and the larger the shoots will be.

The kinds best known are Conover's Colossal, an excellent variety; Palmetto, extensively grown by Southern planters; and the Columbia Mammoth White, producing very large, white shoots.

The roots cost from 75 cents to \$1 per hundred, and the seed from 50 cents to \$1 per pound. In shipping young asparagus plants, it is highly important that they be not packed in barrels, a great many together, as they are very liable to heat and spoil, killing the plants if long on the road. They carry better if packed in small, shallow boxes.

GROWING OF ASPARAGUS PLANTS.

(W. F. M.) "Asparagus plants are grown from the seed and should be a year old before planting in their permanent quarters. Two-year-old plants are sometimes recommended, but well grown one year plants are far better. To grow the plants a piece of very fertile and mellow soil is best, in fact, to produce first-class roots a rich soil is essential, and it is hardly possible to overdo the manuring and preparation of the seed bed. The common practice of those who grow these plants for sale is to sow the seed far too thickly, the object, of course, being to get all the plants possible out of the land. It is, therefore, always best to grow your own plants, and to grow them well, for one well grown plant will give better results than half a dozen stunted ones. Sow the seeds as early as the ground can be gotten in good condition in February, in rows about a foot apart. Thin them if too thickly crowded, and transplant the thinnings to other rows. They are very easily transplanted in an early stage of growth, and the transplanted ones often surpass the others in growth. It is important to keep the seed bed clean and well worked, for if neglected and allowed to get stunted the plants will be inferior and it will take a longer time to get the plantation into a profitable state of productiveness. It will require 10,000 plants to set an acre, and 2 pounds of good seed ought to

produce them. But in the matter of seed it is always best to be on the safe side and use a plenty, so as to be prepared for accidents. Therefore, it will be better to sow 3 pounds of seed for each acre to be set in plants.

PLANTING.

"An asparagus plantation is expected to last twenty years or more. The preparation of the soil should, therefore, be of the most thorough character. A warm, sandy soil is the best, and one which has for some years been cultivated in garden crops and heavily manured is greatly to be preferred to a fresh soil, no matter how heavily manured specially for this planting. But at no period of its growth must the crop be allowed to lack for manuring, for only in very rich soil can first-class shoots be grown. There is far more infertility of soil in asparagus culture than in the variety. Any variety will make good crops with heavy manuring; no variety will do so without it. The land should be prepared in the most thorough manner, and furrows opened 4 feet apart, by going twice in a furrow with a turning plow, and then cleaning it out with shovels to a depth of 8 inches at least if the object is to grow white asparagus, but if the green shoots are wanted the roots should not be more than 3 or 4 inches under the surface. Some markets demand that the shoots be cut under ground, so as to have them blanched, but the tendency now is toward the more tender, green asparagus. Another advantage in not having the roots too deep is that they will start earlier than those set deeply. In the bottom of the furrow scatter coarse raw bone at the rate of 1,000 pounds per acre, the slow decomposition of which will tend to maintain the fertility of the soil longer than most other

fertilizers. The plants should be set with their roots spread out in a natural position, and about a foot apart in the row. Some growers insist upon much wider planting, even as far apart as 3 by 6 feet, but I have never failed to get just as good asparagus at the distances given, and a great deal more per acre, and at less expense. It is heavy manuring which makes fine asparagus, and not square feet. In setting the plants be careful to cover the crown of the root not more than 2 inches at first, as the first shoots from the young roots are not strong enough to force through a deep mass of earth. Gradually fill the furrows as the shoots advance in growth. Thorough, clean culture is essential at all times. As the plants get into a blooming age much trouble will be saved by digging out all the seed bearing plants, as they tend to fill the soil with young plants. These are generally few in number, as the male plants are usually in a large majority. It is of no use to manure the plantation in the fall, when the roots are dormant. All manuring should be done in late winter, just before the plants begin to shoot. Use heavy dressings of stable manure, if to be had, otherwise use a high grade fertilizer, and on alternate years apply half a ton of kainit per acre. This will furnish the salt which the plant seems to like, and potash too. The salt is of more use in keeping down weeds than as manure for the plant. It can stand an amount of salt that the weeds cannot. If well cared for the cutting may begin the third season.

CUTTING AND SHIPPING.

"The roots should be cut well down to the crown of the plant, but care must be used to run the knife down close beside the shoot, so as to avoid injury to the other shoots.

A knife made for the purpose is best. A machine is used for bunching, in which the shoots are placed with the tops all pressed evenly against a board, then clamped tight by a treadle and two flat ties of rafia or bast tied around. The butts are then cut evenly with a sharp knife and the bunch is ready to pack.

"The bunches should be packed upright in crates just deep enough to allow a layer of moss under and over them."

CELERY.

This vegetable will bring money into the hands of the market gardener in the late fall, and if he provides himself with a cellar to house it in, in the winter and early spring; and with care it can be as easily raised in the South as in Michigan.

Celery seed is a very small seed and somewhat difficult to generate unless handled properly. It should be sown in April in a rich, friable soil, avoiding the use of strong heating manures. It is recommended, however, to give the seed a *bottom heat* by putting a layer of fresh stable manure 6 or 8 inches below the surface of the ground, and making the top soil rich with old *well rotted* manure. Sow the seed in drills *watering daily and shade partially from the hot sun* until the plants are up. Unless the bed is well shaded and watered, the seed will not vegetate.

Enough plants can be grown in a seed bed 3 by 10 feet for an acre of ground, an ounce of seed producing about 3,000 plants. At the North the plants are usually grown under glass in hotbeds, but we do not find this either necessary or desirable at the South.

The plants will generally be large enough to transplant about the first of September, and this will be soon enough, as nothing is gained by earlier planting. When set at this time plants get established and are ready for their fall growth and are mature in November, December and January when this vegetable is most in demand.

Ground that has in the spring borne a crop of peas, beets, onions or cabbage, is suitable for celery. Dig or plow thoroughly, leaving the surface free from weeds, and level. Lay off the rows 3 feet apart and set the plants 6 inches apart in the row, pressing the dirt firmly about them. It is best always to set the plants late in the evening, and if the weather is warm and dry, water should be poured in the holes and dry earth raked in finally, so that the ground may not bake. It is well in hot weather to shade the plants the next day while the sun is on them, removing the shade at night.

The old plan for growing celery was to plant it in the bottom of a trench, but this mode is now almost entirely discarded, as better results, larger and better growths are secured by following the plan given here.

Nothing is necessary after having transplanted the crop, excepting to keep it free from weeds by occasional hoeing, until about the first of October, when the "earthing up" should be commenced, drawing the soil about the plants with a hoe and then with the hand lifting the leaves of the plant and "firming" the earth about it, so that the stalk stands erect.

This process is repeated as the plant grows, the banking up being done finally with a spade or shovel and the plant will at last be nicely blanched, tender and ready for market.

The giant varieties are not recommended for planting, as they take more room and handling, and are not of as fine, sweet and nutty flavor as the smaller or medium varieties.

As cold weather comes on, make narrow trenches the exact depth of the stems of the celery, which should then be dug and placed upright in these trenches, packing the plants close together so that the tips of the green tops alone come to the surface. If very cold weather comes on, a covering of hay, straw or leaves will be necessary, but usually no covering will be required. If covered at all, it is best that this be done gradually so that the heat generated by the close packing of the celery may pass off; failing in this, decay is apt to take place.

It is a mistake to suppose that celery can only be grown on wet land; it does well on any good, rich soil. Black sandy or chocolate sandy land that is rich in humus is excellent for this plant, but it will also flourish on rich clay or loam soils. Mineral substances and fertilizers, however, such as coal ashes or fresh wood ashes, or lands impregnated with iron should be avoided, as they tend to rust and spot the young blanching shoots and leaf stalks.

Fresh stimulating manures also should not be used about or on the plants, either when they are growing or being banked up, or the plants will rot.

The following is the old or English method, copied from a leading horticultural journal, which we give so that our farmers may experiment with it. The growing of celery at the South being still a new enterprise, it is well that different plans be tried to secure that best suited for our different locations and climates, for climate and soils vary greatly at the South.

THE OLD PLAN.

"Good celery can be grown on almost any soil, except very light and sandy, or with a porous, leachy subsoil. The best soil, when it can be had, we think, is a black, peaty mold, such as would be obtained by thoroughly draining a swale.

"Dig trenches about 8 inches deep and 18 wide; place the earth taken out of the trenches on each side. Put about 4 inches of well rotted manure at the bottom of the trench, and mix it by the fork with the earth below. Then throw on about 1 inch of earth first taken from the trench, and rake it nice and smooth. This trench is wide enough for a double row of plants, 10 or 12 inches apart, and 8 inches apart in the rows. The trenches should be 5 or 6 feet apart.

"From the middle of June to the first of July (a much later date than this is better at the South), is the time for setting the plants in the trenches, for the main crop. Many fail in raising good celery because they set out poor, spindling plants. Their height is a matter of very little consequence, if they are only strong, stocky, vigorous plants. Celery cannot be called good unless it is well bleached, at least 18 inches, and is solid, crisp and perfectly white.

"The soil should be kept loose around the growing plants, and a little earth may be added occasionally, so as to keep the leaf-stalks in an upright position, but we would not earth up the crop for blanching until the weather becomes cool in the fall, say about the latter part of September or early in October. If the soil is too long in contact with the stalks they become tough, and the quality is much injured. All injured or broken stalks must be removed before earthing. Then hold the stalks carefully together with one hand, and

place the earth carefully around them, but not so high as to permit it to get into the center of the plant. The soil should be first well pulverized, and the earthing should never be done on a wet day, or when the soil is very moist. It will be necessary to repeat this once or twice.

"The rust has only occasionally troubled us, and in those cases we have had no difficulty in ascertaining the cause, and consequently the cure. Earthing up when the soil or the plants are wet, and permitting the earth to get in between the stalks are the principal causes. We have several times used two pieces of horseshoe drain tile for blanching, and sometimes with very satisfactory results, when the earth was only placed just high enough to keep the tile in place. Occasionally, however, they have rotted badly.

"Those who plant celery in our cities and villages generally obtain their young plants from the seed stores, and it is no wonder that they cannot raise good stalks. The plants are puny, miserable things, forced in a hotbed, and grown so thick that they are slender and worthless. Everyone can raise his own plants well, by sowing the seed about the middle of April, in a warm situation. Sow in drills about half an inch deep and 10 or 12 inches apart, and quite thin. After sowing, if the weather is dry, watering must be freely resorted to. After the plants come up keep the ground well hoed and all weeds well destroyed, and thin them out so that they will have plenty of room to grow without being crowded. Every dry spell water thoroughly, and do not allow them to become checked in their growth, as nothing injures celery plants so much as this. When once stunted they never recover."

There is no reason why celery may not be made a profitable crop. All through the northern half of the Southern States we have many localities especially favorable for the growth of this plant.

One thing especially in favor of celery culture here is that there is always a splendid home market for it in the towns and cities of the South, with all the leverage of the long freight haul in favor of the Southern grown article, as to price and profit.

(W. F. M.) "There has of late been a great increase of interest in the celery crop of this State. This is not a crop with which we can hope to compete with the Northern growers for the Northern markets, but there is a large market in all the Southern cities for good celery, which our home growers should supply. Accounts published in the agricultural journals from time to time in regard to the great development of the cultivation of celery around Kalamazoo, Mich., have led many to inquire whether celery may not be grown, at least for our home markets, at a profit in competition with other celery brought all the way from Michigan to North Carolina.

"We would remark in the beginning that climatic conditions forbid that we should compete with the Northwestern growers in the production of blanched celery in summer. Celery is a native of a cool, moist climate, and cannot be made to develop here in our hot summer weather. But, on the other hand, our mild winter climate gives us an advantage in the culture of the winter crop, which makes it easy to grow here at a small part of the expense necessary at the North, where the crop must be lifted and stored for winter. At the prices at which celery usually retails in the markets

of Raleigh and other Southern cities, over \$1,000 worth can be grown on an acre of suitable and well cultivated land, the retail price here being nearly double this. The tall celery sent here in summer from Michigan is grown on a peculiar black, mucky soil, much of it absolutely boggy, to such an extent that horses cannot be used, and all the work of the crop is done by hand power. The cultivators there are Hollanders, who delight in such a soil. While this black muck land grows the most showy celery, it is really of inferior quality to that grown on good clay soil in the cooler season of the year. Celery is one of the most expensive and laborious of crops that can be grown, and any attempts to grow it without a liberal expenditure in the shape of manure and labor will certainly result in a failure to get a crop worth marketing. In this latitude it should always be grown as a second or third crop on the land for the season. It succeeds best on land that has been heavily manured for the early crops, and has a surplus left over for the celery. No matter how rich your land may be in your estimation, you cannot grow good celery without further and liberal manuring. The land used by the Kalamazoo celery growers is black muck from 3 to 10 feet deep, and yet they use immense quantities of manure upon it profitably. In a house garden here, the land intended for celery should be planted in early Irish potatoes or onions. These will come up in time to plant a crop of snap beans, and use them before it is time to plant the celery finally. The first to middle of September is plenty early enough to make the celery plantings in this latitude. Of course, the plants must be gotten ready sooner. If it is to be grown on a large scale for market, it can still follow on the same land from which the Irish potato or onion crop has

been gathered, and on which field peas have then been sown. The peas can be mown in August and cured for cow feed, and the stubble turned over and prepared for the celery.

RAISING THE PLANTS.

"If only a few plants are wanted, it is much cheaper to get them from the North in June or July, and transplant them into a cool, moist soil a few inches apart to develop to the proper size for final transplanting. The plants can now be bought from the growers at the North for \$2 per 1,000, and at this price are cheaper than can be grown here on a small scale. When a large lot of plants are wanted, prepare a bed of moist soil, as mellow in character as can be had. Use large quantities of manure and make it as fine as possible by chopping, rolling and raking. Then mark out shallow rows across the bed and scatter the seed thinly. Cover only so much as may be done by beating the bed over with the back of a spade. The sowing should not be done earlier than May. As soon as the bed has been sown and packed over with the spade, cover it with jute bagging or old gunny sacks. These, spread on the soil, will keep the surface moist and enable the seed to germinate freely. Care must be taken to lift the cover as soon as the seeds begin to germinate, and gradually inure them to the light by propping the bagging up on sticks to shelter them from the rays of the sun. A little shade will be a great help in carrying them through the summer. Screens made of building laths nailed an inch apart, and placed on posts high enough to work under, make an admirable shelter for the beds.

TRANSPLANTING.

"As soon as the plants are an inch or two high they should be transplanted into another bed about 2 inches apart each way. This will make them grow stocky and form a mass of roots that will enable them to stand the final transplanting better. Celery is always best grown as a second crop on land very heavily manured for the early crop. Additions of fresh manure are apt to be harmful, though commercial fertilizers high in potash may be added profitably. As they grow rankly, the tops should be sheared once or twice before the final transplanting. If the young plants are brought from the North they should be transplanted in the same way into shaded beds. The final transplanting should never be done in this latitude earlier than September 1, and for this reason we prefer to get plants from the North, sown later than we can get them to germinate well here. Some of the Kalamazoo growers now make a specialty of growing late celery plants for Southern planting, which they can do in their moist soil and cool climate better than we can. The final transplanting and growing of celery is the point in which the greatest difference comes between Northern and Southern culture. At the North, the growers are obliged to lift their crop in the fall and store in pits and cellars. They therefore grow it in single rows 3 or 4 feet apart, so that horse labor can be used when it is grown on a large scale. Here it is not necessary to lift the crop, and therefore we should grow it so as to earth it up most economically. The great difficulty here in some winters is to keep it from growing all winter and running to seed. We therefore plant the celery in beds, because it is more economical of labor to earth up a

bed than to earth up the same number of plants in single rows, and also because the single rows, earthed up, leave the sides of the narrow banks exposed to the sun, and warm up to such an extent that the celery is kept growing when we want it to become nearly dormant. We can accomplish this better in a broad, flat-topped bed, than we can in single rows. Planted as we plant celery, an acre will contain about 37,000 plants. We set the beds 5 feet wide and of any convenient length, and where a number are planted, a space of 8 feet is left between the beds for the purpose of getting soil for earthing. The beds are never sunk, but planted upon the surface. The rows run crosswise of the beds, and are 1 foot apart, with eleven plants in each row, thus making them 6 inches apart in the row.

THE PLANTING BOARD.

"The planting board is used as a rapid means for keeping the rows uniform and straight, and to prevent the necessity for treading on the prepared land. It is made of an ordinary piece of 1-inch plank, 12 inches wide and 6 feet long. The ends of this board are cut exactly square and notched, or cut, on each edge, beginning 6 inches from each end, and 6 inches apart. To use the planting board, we stretch a garden line along the edge of the proposed bed. The planting board is then laid exactly perpendicular to this line. A plant is then set at each notch of the board. The board is then moved so that the notches correspond with the plants already set, and care is taken to keep it exactly square with the line at the end.

"Another row of plants is set at the notches on the side of the board, and this process is repeated until the

whole bed is planted. In this way the rows are kept exactly straight both ways, and the bed will be 5 feet wide, with eleven plants in a row, and the rows 1 foot apart. The planter stands on the board in planting, and thus avoids disfiguring the bed with footprints.

CULTIVATION AND AFTER TREATMENT.

"After planting, the only thing necessary for some time is to keep the beds well cultivated and free from weeds.

"Celery is a plant which is native to marshes and wet lands, and never reaches its best development in our hard-baking upland red clay, though fair crops can be grown in moist seasons. When a choice of locations can be had, celery should always be planted in lowlands, where it is practicable to irrigate it in dry weather. Success will then be certain in almost any season. The black, peaty soils and swamp lands of eastern North Carolina are as fine celery lands as can be found anywhere. The soil should be as nearly perfectly level as possible, not only to facilitate perfect irrigation, but also to prevent washing, for when a proper location is found, it is best to keep the celery patch in the same place year after year, only giving attention to the fact that it must be heavily manured every year, no matter how rich it may seem. In cultivating celery, at all times it is important that the plants should never be handled while wet with dew or rain, as such handling will cause the leaves to rust and turn yellow. As the celery grows, it will be found that the outer leaves will have a tendency to spread flat out upon the ground. To counteract this it will be found necessary to put it through what is called the handling process, about the first of October. This is done by putting

earth enough around it to hold the leaves upright, and no more than is sufficient to do this should be used—for the final earthing up should be delayed here until November and December. Any attempt to blanch celery early in the fall in this climate will result in a hollow, rusty and inferior product. Christmas is about as early as we should expect well bleached celery, and from that time until March we can have it as fine as anywhere, in fact, better, in our opinion.

"The first handling to put the celery in an upright position, should be made in October. We formerly used for this purpose two boards set on edge across the bed between two rows of celery and held nearly upright by pegs at each end. The earth was then thrown between the boards by two men standing on each side, who afterwards withdrew the boards so as to leave the soil in a ridge between the rows. We now do this in a simpler and better way. Provide two twine strings, 12 to 15 feet long, with a pointed peg tied to each end. Stick a peg opposite the end of a row and about a foot away. Then take one turn of the twine around each plant in the row, so as to draw the leaves into an upright position, and finally fix the other peg into the soil opposite the other end. With the second cord and pegs treat the next row in the same way. Now shovel the fine earth from the vacant spaces on each side of the bed between the rows, and then pack it tightly by hand against the plants. Use earth enough and no more, to hold them firmly in an erect position. Now untwine the strings and use them in the same manner on two more rows, and so proceed until all the bed is handled up. Be sure to do this when the celery is dry, as before suggested. In the subsequent earthing, if the celery has outgrown its upright position, it may be

necessary at first to use the strings again, but if the spaces between the beds are kept finely cultivated it is usually sufficient to hold the plant in the hand while an assistant shovels fine earth around it. It is most important that the earth should be kept out of the heart of the plant. When the final earthing up for the bleaching is begun, care must be used to build up the outside of the bed at least 6 inches wider than the rows are long, so that the 5 foot bed will be inclosed in a bank of earth fully 6 feet wide. Keep adding earth as the tops elongate, and finally, about Christmas, cover entirely over with earth, and cover with straw or forest leaves to keep the frost out.

"As before intimated, while celery grows to a large size in the black, boggy soil of the Kalamazoo celery gardens, the best celery, so far as solidity and flavor are concerned, is grown on a moist clay loam. We have an abundance of black peaty soil in eastern North Carolina that will grow celery as large and showy as the Michigan lands, but those who have moist, loamy clay soil are very well situated, particularly if located near a stream, so that irrigation can be practiced.

"Numerous varieties are named in seedsmen's catalogues, but it is well to bear in mind that the dwarf celeries so popular at the North, are not so well adapted to the Southern climate. Golden Heart is one of the best, and we have good reports of the Giant Paschal, but have not grown it. A good strain of the old Giant White Solid is hard to excel. Henderson's White Plume is liked by some, but we have never found it to do well here. Sandringham is a fine sort, intermediate between the dwarf celery and the giant. Celery is shipped tied in bunches of four or five stalks, packed in

crates with damp moss. Celery grown here must seek its market in our towns or southward. We cannot compete with the Northern growers for the Northern markets."

CUCUMBERS.

We will suppose the reader has a truck farm near a railroad station on a main through line running north and south, and so has good shipping facilities.

We will also suppose he has provided himself with hotbeds or a greenhouse. These advantages being secured, let the seeds be planted in rich earth in the hotbeds, under glass, about the first to middle of March. The Early Frame or the White Spine are the leading early sorts.

As soon as all danger from frost is over, say from the first to middle of April, when the first rough leaves are formed, transplant to the open ground. It is well, however, to have frames a foot square, 6 inches high, with glass or muslin tops, to put over the hills in case of subsequent cool nights or unseasonable frosts. With care in setting, the plants will be very little retarded by transplanting. They may, however, be raised in the hotbeds, in quart berry boxes, from which the bottoms have been removed, and these set as deep in the ground as the box is high. When the plants are large enough they are carefully lifted out and reset in the open ground, the growth not being stopped at all.

The outdoor bed should be very deeply plowed, or trenched, and the hills should be made 6 feet apart each way, using in each a peck of well rotted manure well mixed with the other soil, and some guano or poultry droppings, which, however, must be placed in the bottom of the hill. Fresh horse manure should not be used, as it will burn out

the plants. Instead of this, use well rotted fine cow manure, good compost or leaf mold, covering the manure with rich, mellow loam, mixed with leaf mold or rotted chip earth from the wood pile.

Liquid manures are beneficial, such as guano or cow manure water, but should not be made too strong. The plants should be worked frequently until they begin to blossom and set fruit, and as soon as blossoming commences the ends of the shoots should be nipped off with the fingers, thus throwing the strength of the vines into the fruit, causing it to ripen earlier.

If the yellow striped bug or the cucumber flea attack the vines fight them off with dry wood ashes, air slacked lime or land plaster, sprinkled on the vines when they are wet with dew, or cover the hills with boxes a foot square with millinet or mosquito net covers. Very soon, if the plants grow well, they will be too strong to be much affected by these insects.

For shipment, cucumbers should be carefully and tightly packed in one-third bushel boxes, leaving out all those misshapen or imperfect.

In places where farmers' shipping clubs exist, carload lots of mixed vegetable products such as cucumbers, snap beans, asparagus, early peas and strawberries can be forwarded by the club, securing carload rates; but probably it may be best to ship the very earliest cucumbers by express, as the prices are then sufficiently high to make it pay.

Information in regard to farmers' shipping clubs will be found on another page.

A very early crop is the great thing with cucumbers; every effort should be made to secure this, as late cucumbers

are very cheap while early ones bring good prices. Two to three pounds of seed plant an acre, or an ounce, sixty hills. The seed costs usually 10 cents per ounce or 75 cents per pound, but it can be very easily saved by the farmer himself from the largest and earliest fruit, growing nearest the main stem.

(W. F. M.) "The cucumber crop is one of importance to the Southern trucker, and a profitable one when gotten into market in good color and early. It is a crop in the forwarding of which in frames a much greater profit can be realized than from the mere planting in the open ground, for by the use of glass we get them into the Northern market as early as those south of us, who depend only on climate, and ours, getting to market in a fresh condition, will bring better prices. While cucumbers are largely grown in all the trucking sections of the South from seed planted in the open ground, and enormous quantities are shipped, the usual crop being about 1,000 bushels per acre, they have not been regarded by our truckers as a very profitable crop, owing to the fact that before the crop of one section is marketed the warm weather has brought on the cucumbers of the growers a little north of the section, and their fresher condition shuts out those south of them.

"It is by forwarding the plants, then, that we can best avoid this. The outfit of sashes and flower pots for forwarding cucumbers and cantaloupes, which are treated in a similar way, on a large scale, is a costly item, and this fact makes the practice all the more certainly profitable, as it prevents the competition of those who are ever ready to rush into the culture of a crop that does not cost much to grow. Aside from the sashes we must have a supply of pots

of the 4 inch size. These are now made in large quantities by machinery at very low rates, and can be had, delivered in lots not less than 1,000, for about 1 cent each, and, if properly handled, will last many years and be useful for many crops.

"In preparation for forwarding the plants in pots, a full supply of compost for filling the pots must be prepared the previous fall by cutting grass sods and getting black mold from the forest, and piling them in layers with well rotted manure, putting about two-thirds sods and leaf mold and one-third manure. This must be turned and well mixed several times during the winter, and before using should be passed through a gravel screen to make it uniform and to remove all lumps and rough material. The pots are filled with this compost and set closely and perfectly level in frames, seed are scattered in each, and more compost is sifted over them to cover the seed. They are then well watered with a sprinkling watering pot until the entire soil in the pots is wet through, and the sashes are put on and kept close until the seeds germinate. Great care must be taken to exclude mice from the frames, and careful attention must be given to watering. As the seeds germinate careful attention must be given to airing them on sunny days by slipping down the sashes more or less, according to the weather. If left shut up closely on a warm, sunny morning the temperature may get so high under the glass as to seriously injure or destroy the plants. Equal care must be given to protect the glass in case of a severe night by having a plentiful supply of pine or other straw at hand to cover the frames. As the plants develop, thin to two plants in a pot, and as the

weather grows warmer give more air and gradually insure them to full exposure.

PLANTING.

"The land into which the cucumbers are to be planted should be well prepared beforehand, and the hills marked out with a plow 5 or 6 feet each way, and a shovel or two full of manure or compost placed in each check just as in planting seed in the open ground. The plants in the pots should now be well watered, and then knocked out of the pots without breaking the ball of soil, and carried to the field in flat boxes. The knocking of a plant out of a pot is a very simple thing to an expert, but beginners are apt to make an awkward job of it. Have flat-topped stakes driven into the ground near the frames. A man takes a pot, turns it upside down on the palm of his left hand, with the stems of his plants between his fingers; then, with a smart tap of the edge of the pot on the top of the stake, the ball falls into his hand. The plants are set in holes made in the compost in the hills and the earth packed closely around the ball, and the whole is covered a little deeper than it grew in the pot. The subsequent culture is just the same as if seed had been planted in the hills. I have set plants in this way in bloom without the loss of a plant.

"In raising the crop from seed in the open ground the only difference is to plant the seed in the hills a little earlier than it would be safe to set out the pot plants. Cultivation must be rapid, as the vines will soon stop it. The crop is laid by by bedding up to the plants with a plow. The same treatment will answer for muskmelons, and we will, therefore, not repeat it for that crop. The hills should be made with a shovelful or two of compost of manure and black mold

from the woods and a handful of high grade fertilizer sprinkled over it and covered with soil upon planting the seeds.

VARIETIES.

"The catalogues give long lists of cucumbers, but the truckers still adhere mainly to the White Spine. A good strain of this variety is all that need be desired."

TOMATOES.

There is hardly any other vegetable raised at the South that when well managed gives better results than the tomato.

The first thing to be considered is a good kind, the second, to grow them early. For market, one of the most important points is to secure a good shipping variety. Probably as good a sort as any in this particular is the Stone. Other good kinds are the Buckeye, Beauty, Acme, Paragon, Perfection, Favorite and Ignotum. Some growers may for their localities prefer other sorts, but those named are all good market and shipping varieties.

Of course tomato plants, North or South, should be raised in hotbeds or in a greenhouse to secure early fruit, and the seed should be sown about January 1, and then be taken up and reset, giving them more room each time, until the weather will permit setting them out of doors, which will generally be from the 1st to 10th of April.

If the resetting has been properly attended to and they have had plenty of light and air when the weather was not too cool, they should by this time be large, stocky plants, just ready to blossom and the first fruit be ready for shipment the 1st to 15th of June.

While it is well at the South to train the vines on some low support, such as parallel bars a foot apart, 18 inches

above the ground, it is not well to train them high on poles, so that the hot sun can beat upon the crown of the roots, as this greatly shortens the time of their bearing, the vines drying up and dying. If you have plenty of straw, mulch with this between the plants, and dispense with any bars or supports.

Chickens, even young broods, should be kept entirely away from ripening tomatoes as they will destroy them as fast as they ripen.

For shipment, tomatoes should be picked before they are fully ripe, in fact, just as they begin to turn, and packed tightly in one-third bushel crates.

The growing of tomatoes is so well understood it will not be worth while to give minute directions here. The only points to be noted being that it is not best to manure tomatoes too highly, as the growth of vines is stimulated at the expense of fruit, and that when plants begin to blossom the center shoots should be nipped off, as the best and largest amount of fruit is produced upon the lateral branches, and this pruning also causes the fruit to mature more rapidly.

(W. F. M.) "To the gardener who has a good outfit of greenhouse and frames, the growing of the early crop of tomatoes can be made one of the most profitable of all the crops of our Southern gardens. With the proper treatment it should be perfectly easy for the gardener in our eastern section to put his tomatoes in the market by the first week in June, and all tomatoes shipped up to the second week in July will usually bring good prices, if a good sort and in good order. In fact, we have had ripe tomatoes in the open air in Raleigh as early as the 25th of May. To get them thus ahead of their natural season requires glass, skill and

attention, and this fact will always prevent the glutting of the markets, as is often done, with those vegetables that can be grown by anyone without these requisites.

"Assuming, then, that the gardener has the necessary greenhouse, it is necessary to begin the sowing of the seed at least ten weeks before it will be safe to put the plants in the open ground. This means in our eastern section that we should sow the seed about the third week in January. For sowing the seed we use boxes or flats made usually by cutting an ordinary soap box in three flat boxes. These boxes, about 3 inches deep, are filled with the prepared compost recommended in potting cucumbers and melons. The seeds are sown thickly in the boxes and placed on the bench of the greenhouse close to the glass, and a night temperature of 60 degrees is maintained. As soon as the plants are well up, and before they have made the second leaves, they are transplanted to other boxes an inch or more apart, and when well established in these boxes the temperature at night is kept a little lower, say 50 to 55 degrees, and the boxes are kept as close as possible to the glass to prevent the plants from being drawn up with weak stems. The house must be well ventilated during the daytime for the same purpose. Should the plants have a tendency to run up tall, the tops should be pinched out, but we prefer not to prune them at all, unless absolutely necessary. If 3-inch flower pots are at hand this first transplanting can be more profitably made by putting the plants in the pots, as experiments have proved that plants handled in pots are earlier than those handled in boxes.

"By the 1st of March the plants should be taken from the greenhouse and planted in cold frames about 4 inches apart each way. They should now have all the exposure to

the outer air possible, only putting the glass over them at night and in cool, cloudy weather. The object is to get stout, short and well-hardened plants. By the 1st of April, or sooner, the glass can be left off at all times, and the first week in April they can be set in the open ground. It is always best to get them out as early as practicable, even if they have to be protected from frost afterwards, which is easily done, for we have found that the earlier the plants are in the open ground and live, the earlier the crop. Last spring, as an experiment, we set out some tomato plants the 17th of March. On the 26th of March the mercury fell to 21 degrees, but we saved the plants without much trouble. Having warning from the weather bureau of the approach of the cold, we went to work and bent each plant to the ground and placed a wisp of straw on it, while an assistant shoveled the mound of soil over each. The plants went through the freeze unharmed and made the earliest fruit. As we seldom have, even in March, so great a degree of cold, it will be seen that it is easy to protect the plants with a shovelful of soil against any frost we may have after the 1st of April.

"These early plants seldom suffer from the Southern blight, which is so troublesome with the late crop here, but they are very subject to the rot. This can be warded off by the use of the Bordeaux mixture. The plants should be sprayed, as soon as set out, with the mixture at half strength, and the spraying should be repeated as they bloom and again as the fruit swells. We have not as yet proved that this spraying will prevent blight, since our experiment last year for this purpose was not conclusive, there being no blight on the sprayed or unsprayed plants, the planting being on ground where there had been no tomatoes grown before.

"It is always important to plant tomatoes here on land that has not had tomatoes, potatoes or melons on it for several years, as all of these are subject to the same blight. Tomatoes should be shipped as soon as they show signs of turning, for if allowed to get fully colored they will not arrive in good order. For the earliest it will pay to wrap in paper, as they can be thus packed more securely. The packing should be in crates with the slats nailed rather close, as wide cracks will often cause the fruit to be badly cut. Culling should be very carefully done and no cracked or damaged fruit allowed in the crate. It is easy to make a reputation for a brand of anything, and in no vegetable is this of more importance than with the tomato.

TOMATOES FOR WINTER.

"We have for years been trying various ways to prolong the season in which fresh tomatoes may be had after frost, and have settled on the following as the best. The plan may also be made a matter of profit for shipping, for we have had the fruit in good condition at Christmas, when the price was 25 cents per pound. About the 1st of July we make cuttings about a foot long from vigorous vines that have made good, smooth fruit only. After a good rain these are set in well prepared soil nearly their entire length. At this season the soil is so warm that they root with the greatest certainty, and we seldom find one that fails to grow if the soil is moist and well packed about the base of the cutting. They are set at the same distance as plants, and are cultivated in the same manner. These plants will begin to ripen late in the fall, and will be full of well grown green fruit when frost arrives. When the first light frost nips the foliage the whole crop is gathered.

They are wrapped in paper, packed in crates and stored in a place where they will keep cool but will not be frozen. Any tight outhouse where the crates can be covered with straw in cold weather will answer. For family use a few are taken out at a time and put in a warm room to ripen for the table. We have them in this way until the middle of January nearly every year, in nice condition for slicing. If grown in quantity for shipping they should be overhauled from time to time and the ripening ones rewrapped and shipped up to Christmas, when the whole lot can be shipped, as they will sell even if not colored, as they will soon ripen up in a warm temperature, or it may be better to bring them into a warmer place to color before shipping."

PEAS.

Early green peas are a good shipping crop at the South. Very few directions need be given for their culture, as they would be in the main the same as for any other part of the country. We recommend for early shipment the medium low early sorts such as all the leading seedsmen advertise as "Extra Early."

While there is an advantage in dwarf varieties, as requiring no sticks, we have found this to be more than overbalanced by the superior yield of the medium low sorts.

Most of the very early varieties will endure such light frosts as we sometimes have in the South in March, and the early part of April, so that it is well to plant as soon after the 1st of March as possible, or in the lower South the first to middle of February. Boards 12 feet long, 10 inches wide, nailed together gutter fashion, are very useful, forming covers to place over the rows on frosty nights.

We recommend sowing the seed in furrows as broad as the blade of a hoe; a larger crop can be gotten per acre in this way and the same amount of brushing serves as when they are planted in a narrow row. By this method $2\frac{1}{2}$ to 3 bushels of seed plant an acre, or 2 quarts to an 80 foot drill. Sticks can be dispensed with if the space between the rows, which should be about from 18 inches to 2 feet, is filled with leaves or straw. Peas should be well worked two or three times when the ground is not too wet, before they are brushed, or before straw is placed between the rows.

In the extreme lower parts of the Southern States peas in some years do well planted in November, December, and so on until spring is fairly open, but cannot be relied on as an every year crop.

In any case it is well to plant for a stand, or for a succession, every ten days or two weeks.

The later (and better) sorts, such as Champion of England, Strategem, Marrowfat, etc., should be planted deeply, 3 or 4 inches is not too deep, quite as early or even earlier than the early sorts are put in the ground, say by the first to middle of March. By deep planting the peas will be found to be longer lived and bear better than if planted shallower. Peas may be planted for a succession for family use up to the 1st of May at the South; after that they do not grow or produce well, and as Lima beans and green corn are ripe just as peas sowed as late as 1st of May are ready for use, they are not then relished as much as earlier in the season. We have not found late sown peas to succeed at all; they grow spindling, and poor, and in fact amount to nothing as a crop, while early plantings, both of early and late ripening varieties, do admirably and bear heavy crops of delicious flavor.

Peas should be sent to Northern markets packed tightly in one-third bushel slat boxes, the same as peaches; care being taken in packing that the peas near the openings between the slats lie across the openings so that they will not shake through in transit. Peas will hardly pay to be sent by express excepting the very earliest ones, and advantage should be taken by the forming of farmers' coöperative shipping clubs, to ship these, in connection with other early vegetables or fruits, at through carload freight rates.

(W. F. M.) "Early English peas are one of the most important of the crops grown by the Southern trucker. Not that they are always very profitable, but being easily and quickly grown, they help out the variety and keep labor employed in the early season. They are so easily grown on large areas that the crop is more apt to be overdone than any other except early potatoes. The sorts grown by our gardeners are the extra early sorts and the later Marrowfats. It seems a little odd that the later peas are always sown earliest. The tall-growing Marrowfats, that need some support, are very commonly sown in large areas alongside the dead stalks in the cotton fields in November and early December, and allowed to cling for support on the dead stalks. The extra early sorts are sown on carefully prepared land in January and February.

"The soil for peas should be light and warm. Land that has been well manured for a crop the previous year will need little manure to make a crop of peas, but it is a mistake to suppose that any soil is rich enough for them. They will pay as well for fair manuring as any. But no fresh stable manure should be used on the pea crop, as it induces too rank a growth of vine. A fertilizer with a small percentage

of nitrogen and high in potash and phosphoric acid is best for them, and 300 to 600 pounds may be used, as to the fertility of the land. While peas are generally sown for early spring sales it has become quite common and profitable of late years to sow a crop of the extra early sorts in September for shipping in November. This fall crop often pays better than the spring one.

"The crop is sown in deep furrows quite thickly, so as to make a broad row, the better to sustain itself, as market gardeners seldom brush their pea vines. Rather deep covering is needed, to better enable the plants to resist the changes of the weather. Four feet apart is about the usual distance between the rows for early peas.

"A good early pea for market purposes should be of a strain that makes vines of uniform development, and that ripen their crop all together, so that all can be gathered and shipped at once. There is a constant tendency in the early peas to revert to a taller and later type, and if the seed stock is not carefully 'rogued' of these reverions the whole soon becomes a sad mixture. At this station we have in past years made careful tests of many varieties. Most of the variously named extra early peas are Daniel O'Rourke, some better rogued than others. The strains sold under the names of 'Nonpareil,' 'Eclipse' and 'Hancock,' we have always found to be the earliest of the class."

BUSH BEANS.

The climate of the South in the spring and summer is eminently well suited to the growth of this vegetable.

Bush beans can be planted the middle of March, if preparations are made to protect them at night from frosts, by the

use of inverted gutter shaped board covers. The bean is a very tender plant and will not stand frost, but as all danger from this source is past even in the more northern portions of the South by the middle of April, this vegetable can be ripened and put into Northern markets a month to six weeks earlier than those Northern grown.

The Early Mohawk is the hardiest and earliest variety, and is very prolific. It is an old favorite. After these come the Early Speckled Valentine and the Dwarf Golden-eyed Wax bean, etc. Two bushels plant an acre, costing from \$4 to \$5 per bushel. The broader sorts, such as the bush Limas, should always be planted with the eye down, as this is the natural way for them to grow, and if not planted in this position they are forced to turn over, and in so doing are liable to be snapped off, delayed in coming up and in many cases of rotting in the ground. The rows of bush beans should be 18 inches to 2 feet apart, and the soil, while mellow and friable, need not be very rich.

In cultivating beans, either bush or pole varieties, let it be when the vines are dry; working them when they are wet is said to cause them to rust.

For family use it is well to plant a few rows, say five or six, 20 feet long, every two weeks during the spring and early summer months, before the Limas get into full bearing, that a succession may be had. Then in September plant again, and by replanting through the fall you can have nice snap beans until frost comes.

Henderson's bush Lima bean has come into favor lately, being a week or two earlier than the Carolina (Sewee) pole Lima. It yields well all through the summer, throwing out new shoots and blossoming and bearing fruit until frost.

The rows of these bush Limas should be put farther apart than those of ordinary bush beans, as their bearing season being so long, they need working late in the summer, and crab grass being at that time rampant, it is hard to keep it down, unless plenty of room has been given to work between the rows. A good plan in field culture might be to plant as ordinarily; pick and ship the early fruit; and when crab grass begins to put in an appearance heavily, let it take the patch, and when well grown mow crab grass, beans and all for hay. It will make an excellent combined hay. In this case the cultivation of the beans should be as level as possible to facilitate the mowing.

Early beans, whether of the ordinary "bush" varieties or the bush Limas, are a good shipping crop for the well located truck farmer at the South, and as they do not weigh heavily to the bushel the freight charges on them as well as on green peas are comparatively moderate. They should be shipped in one-third or one-half bushel crates, carefully packed crosswise of the slat openings.

(W. F. M.) "Snaps are one of the leading crops of the Southern trucker. They need the lightest and driest land of the farm, and the warmest exposures. They are more cheaply grown than any other crop of our gardens, and occupy the land but a short time, making a good succession crop to the early cabbage crop, without any more fertilization, and when the crop is gathered, the vines can be plowed under to fertilize the land and be followed by a crop of crab grass for hay. As the profit in them is mainly in the earliest, it pays the gardener to run some risk in order to be in among the earliest. It is therefore common to begin the planting by the middle of March, although there is serious risk that

these early sown ones may be cut off by frost. But if they survive they pay better than later plantings. When planted on land especially prepared for this crop, manure of some kind must be used in the furrow. Some gardeners consider fresh stable manure best, but this is seldom available, and we consider it a mistake to use it on a leguminous crop like the bean. Beans do not need heavy manuring, and a dressing of 500 pounds per acre of a high grade fertilizer, well mixed in the furrow, will be sufficient for them. Two furrows should be lapped over the manured furrow, the ridge thus made rolled flat and the seed drilled on this flattened ridge. A skilled hand can sow the bean in a shallow furrow very well in the absence of a seed drill, but drills of various kinds, both for hand and horse power, are essential to every well equipped truck farm. An ordinary cotton seed drill will sow beans as well as anything else.

SHIPPING.

"The green beans should be shipped in well ventilated bushel crates. The pickers must be instructed to pick the pods as soon as they are of fair size and before they are old enough to show the bulge of the seed. They must use both hands so as not to disturb the roots of the plants. The packing in the crates must needs be done with care, as the beans shrink in transit and the crates should be full on arrival. A light sprinkling before packing will help in this matter, and the packing should be regular and firm and not a promiscuous tumbling into the crate.

"When the crop is gathered the vines should be at once plowed under, either for some succession crop, or for the natural succession crop of crab grass hay, which is one of the most valuable crops of the Southern market garden."

POLE BEANS.

First and foremost on the list at the South is the pole Lima, and so far as we know, nothing as yet has surpassed or even equaled the Carolina or Sewee variety for earliness and productiveness. It is a vigorous grower as soon as the weather gets warm enough to favor it, a very prolific and sure bearer, and although the pods are small, the beans are so plump, sweet and satisfactory as to make them great favorites. This is the old reliable "butter bean" of the South.

Lima beans (this is also true of other sorts) do not exhaust the soil as other vegetables do, and are often planted at the South year after year on the same ground and the last crop is as good as the first. Still it should be noted that this plant does best on a rich, loamy soil, richer and heavier in fact than the snap or kidney beans require or thrive on. It is well therefore to give the ground a good top dressing of *thoroughly rotted* manure or compost at least every other year.

Other varieties of pole beans, such as the Kentucky Wonder, Crease Back, Southern Prolific, etc., are good sorts, but are not as popular at the South as the Carolina Lima, which will stand any amount of hot, dry weather, keeping green and continuing to grow and bear successive crops until frost cuts it down. There are several other varieties of Lima beans advertised by the seedsmen, but those we have tried have thus far not proved as good as the old sort. We think it likely that having originated at the North they may be better suited to Northern climates than to the Southern.

TO DESTROY WEEVIL IN BEANS OR PEAS.

Beans or peas for seed purposes may be kept from the ravages of weevils by putting them in a coarse cotton or linen bag, then dipping it into a kettle of boiling water, allowing it to remain there for two or three seconds only, and then thoroughly drying the seeds.

SWEET OR SUGAR CORN.

This is the variety that sells best in the early Northern markets, although the Extra Early Adams, which is white, but is not a sugar corn, on account of its being earlier than any other known variety, is largely grown. Following the Adams come in the sugar corns in the order we give them below, viz: Cary, Early Minnesota, Country Gentleman (or Shoe-Peg), "Moore's Early Concord," and Stowell's Ever-green. We shall not take up time and space in giving here full directions for culture, as that is treated of under the head of field corn on page 51.

We need only say that in order to secure a stand of early corn it is best to plant very thickly, as sometimes the grain rots before generating. It is a great deal better to thin out to a proper stand than to have to replant. It is well, however, after the first planting, which in the middle South should be about the 15th of March, to plant again in ten days in other hills between those first planted, so that if one is caught with late frost the other may succeed.

Another plan recommended is to cut pieces of grass sod 4 inches square, place them grass side down, side by side in shallow boxes in hot beds or a greenhouse, and on each of these sods plant six to eight kernels of corn, cover with a little earth, thinning out to two or three plants when these

sods with the growing corn have been transferred to the field or garden. Cucumbers can be started early in the same way, in fact, this plan can be used advantageously with many early vegetables.

Sweet corn is ripe at the South from the 1st of June to the 1st of July according to season, latitude and elevation; it being a well known fact that elevation counts largely as latitude where the mountain ranges sweep across the country.

TURNIPS.

While this vegetable is not grown for shipment, it is of so much value and importance to the Southern farmer it demands attention.

Turnips do best on a moist, rich soil; well rotted cow manure being the best fertilizer. Sow in August or September, preferably after or before a good rain.

The best sorts are the globe, red top, purple top, strap leaf and the white flat Dutch for hill and uplands, with large white globe, large yellow globe, and rutabagas for rich bottom lands and for stock feeding.

The land upon which turnips are to be sown should be deeply broken up with a two-horse turning plow early in July, following this just before seeding with thorough working with cultivator or harrows, a rotary harrow preferred, so that all weeds are killed and the surface soil is fine and light.

The best mode to plant is to drill, but they are more frequently put in broadcast and brushed or lightly harrowed in. When drilled in, the drills should be from 16 to 30 inches apart, according to variety and the tools to be used in cultivating them.

On good ground, where a good stand has been secured, they should be thinned out to from 4 to 10 inches in the row, and where properly cultivated, the yield is often enormous. When ripe, they should be stored in frost proof root cellars or pits, and are an excellent ration after being sliced with a root cutter, for cattle, milk cows, calves, sheep or hogs.

One and a half pounds of seed sow an acre, costing about 50 cents per pound.

CARROTS.

These, like turnips are not a shipping product at the South, but are valuable to the farmer and stock raiser, and where properly grown on rich, deeply broken ground, such a heavy yield can be produced per acre as to make it quite a profitable crop, a yield of from 18 to 25 tons (600 to 800 bushels) having frequently been grown, per acre.

Break ground for carrots deeply with two-horse turning plow, the deeper the better. This should be done the preceding fall or winter, the ground being made rich with well rotted manure. There is no danger of getting it too rich. A mellow loam or sandy loam soil is best for this plant, and they should be well worked to keep down weeds and the ground mellow. The soil should be made fine and the seed planted in drills 15 to 18 inches apart, covering lightly with fine soil, which should be pressed down upon the seeds to ensure their germination.

It is important that carrot seed be sown early, as late sowings will not vegetate. It is recommended by some to sow at the South in October, or early in November; but as we have never tried this plan, we cannot tell how it would

succeed. By sowing in March a good stand can generally be secured.

Every farmer can easily save his own carrot seed by leaving some of the best roots in the ground, covering them in severe freezing weather in the winter. The next spring they will send up seed stalks plentifully, the best developed being saved when ripe. Two to three pounds of seed are required to plant an acre, costing from the seedsmen from 85 cents to \$1 per pound.

Carrots are an excellent food for horses, cattle (especially milk cows), sheep and hogs. It is best when fed they should be clean, free from sand and soil, and are best sliced and mixed with a light ration of meal or bran, and a good sprinkling of salt.

BEETS.

Early beets might be, but rarely have been, shipped from the South as a market crop. They are, however, a very acceptable vegetable for the farmer's own table, and where they can be shipped with other vegetables by a farmers' shipping club, at carload rates, will certainly in the early spring pay well.

Ground upon which beets are to be grown should be thoroughly and deeply plowed the previous fall or winter, and if not naturally rich should be made so by the use of good, thoroughly rotted manure, or a good dressing of wood ashes.

The drills should be from 15 to 18 inches apart, and the plants thinned to 6 inches in the rows. In planting it is well to water the seed in the drills, then cover lightly with dry rich soil, pressing it down with the hoe or a board.

The best varieties for table use are the early turnip-rooted blood and the early Bassano. For field culture for stock feeding, the kinds recommended are the sugar beet, the mangel-wurzel and the golden tankard, the latter not at all suitable for table use, but valuable as stock food in the winter. Four to five pounds of seed are required to the acre.

(W. F. M.) "The early turnip-rooted varieties are the only kinds of beets that are of importance to the Southern trucker. Though growing mainly on or near the surface, the beet, on account of its long tap root, requires a mellow, deeply-worked soil, and one in which the fertilizing matters are very uniformly distributed. Coarse, lumpy manure makes ill-shaped roots, and it should never be used. Soil that has been for years well manured and cultivated in vegetables is best for the beet crop, and a good crop can seldom be made on land freshly taken in vegetable culture, no matter how well manured.

"While quite a hardy plant, beets are easily destroyed by a freeze when just germinating. But the market gardener must always take some risks in order to be in among the earliest. We, therefore, sow beets among our earliest crops in February, and stand ready to replant if destroyed by a late frost. Half a ton to a full ton of high grade fertilizer, is needed for the best results, according to the previous manuring of the land. The rows should be wide enough apart to admit of horse culture. Furrows are marked with a plow and in them the fertilizer is scattered and covered with furrows from each side. The ridge thus made is flattened with a roller and the seed drilled with a garden-drill on these flattened ridges. We have found it a good practice to sow a few early radish seed mixed with the beet seed. These

come up at once and mark the rows, and are pulled out of the way for sale before they harm the beets. The so-called seed of the beet is really a fruit, with many germs or seeds, and thinning is an important matter. This is done very much in the same way that cotton is thinned. Frequent cultivation is needed and the rows must be kept clean by hand weeding. One bar plowing and two cultivations, with one hand hoeing will usually make the crop.

SHIPPING.

"Early beets are shipped before they are full grown and while yet tender. They are fit to ship as soon as they are about 3 inches in diameter. Pull them and trim the leaves to about 3 or 4 inches from the roots, and pack neatly and closely in ventilated barrels and cover the top of the barrel with bagging. They will command a better price if tied in flat bunches by their tops, three or four in a bunch, before packing in the barrels.

VARIETIES.

"For family use we know no better early beet than the old Bassano, but its big top and light color condemn it for the market grower. For many years the Extra Early Egyptian beet has been the standard sort with the market gardeners, because of its earliness, small top and dark crimson color, and it is still largely grown. But it is a beet of very poor quality, and soon gets hard and stringy. The Eclipse beet has of late years rapidly attained popularity, and is superseding the Egyptian, being a handsome, globular beet of good color and quality. Lentz' Extra Early Blood Turnip beet has also gotten popular with gardeners by reason

of its size, good quality and small top. These last two we consider the best."

RADISHES.

Where a good local market can be secured radishes pay well as a truck crop, and for the farmer's own table they are a pleasant relish in the early spring. They are of two sorts, the summer and winter varieties. Of the summer sorts there are the long scarlet, the half long and the short turnip rooted, the latter being the earliest. They should be sown as an outdoor crop just as soon as the hard freezes are over in the spring, say the first of March, and after this for a succession every ten days until the middle of May.

It is well to sow them in drills so that they can be worked, but are more commonly sown broadcast, and grow well this way when the soil is light and moderately rich and they are not allowed to suffer from drought.

The flea beetle or turnip flea is sometimes very destructive to young radish plants; air slackened lime dusted over them when wet with dew, or water impregnated with tar or weak carbolic acid sprinkled over the plants it is said will drive the fleas away.

CAULIFLOWER.

Well grown heads of early cauliflower are a splendid shipping product for the Southern truck farmer. Their handling is much the same as that of the cabbage. They require a *rich, well worked* soil, clays and loams being preferable. Dressings of salt, ashes and lime the previous year being very beneficial. No good heads can be raised unless the ground has been deeply worked, and is rich in nitrates, phosphates

sulphates, soda and potash. The latter can be supplied, if deficient, by the use of common salt and wood ashes; phosphates from ground bone, and nitrates from manures (well rotted) or the use of green crops of the clover or pulse families plowed under the season before. Added to these a top dressing of land plaster (sulphate of lime) will be found beneficial.

To the above, which are all comparatively inexpensive, may be added guano used in the form of liquid manure, not too strong, applied around (not on) the plants when they are in an active growing state, after transplanting. The growing plants should be worked often, the ground being kept mellow and light.

To secure early heads, sow cauliflower in September, in cold frames or beds, in rich soil, and if the weather should be dry and hot, water frequently and shade the beds with brush or sacking covers until the seeds sprout. When the plants are large enough transplant them to other beds, setting them 3 to 4 inches apart in soil that is not too rich, giving them plenty of fresh, cool air, night and day when the weather is not too cold. All members of the cabbage family, to which this plant belongs, endure light frosts without injury.

If a fall sowing has been neglected sow in January in hot-beds, cold frames, or in the greenhouse, and the plants will then be ready to remove to the open air about the 1st of April; while those raised in the fall can be set out in open ground about the 1st of March; a little protection being necessary if very cold nights or days should come. Work the ground *frequently* until the plants are large and well established, and if the season is dry, water them, fighting off worms by the same methods as are recommended for cabbages.

In shipping, pack them snugly in crates that will just hold them in two tiers, back to back; a sufficient amount of the green outside leaves being retained to cover the white edible centers and keep them from being bruised.

The broccoli is similar to the cauliflower, but is not so delicate in flavor, so handsome or salable. Its cultivation is the same as that of the cabbage or cauliflower.

CAULIFLOWER AND LETTUCE.

(W. F. M.) "While fairly good cauliflowers can be grown in the coast region of the South in the same way in which the early cabbages are grown, the crop is by no means a certain one. The plant is more tender in its nature than the cabbage, and a severe check in its growth, while it may not destroy the plant, will cause it to 'button,' as the gardeners say, that is, to make a little abortive head prematurely, that is perfectly worthless. For this reason it is always better to grow early cauliflowers in cold frames associated with the winter crop of lettuce.

"The seed for this purpose should not be sown later than the 15th of September. Early in November they should be set in frames, six plants to each 3 x 6 foot sash, and the rest of the space in the frame set with Tennis Ball Lettuce, 6 inches apart, from seed sown a week earlier than the cauliflower. The soil in the frames should be of the richest possible description. The glass should be put over the plants at once and shaded with bagging until the plants recover from the transplanting. Then the shade must be removed and the plants exposed in all sunny and warm weather, but the sashes should always be drawn over them on frosty nights. The object is to keep all in a state of

healthy growth, but not to keep so close that a very tender growth will be made, as they may be seriously injured then by a sudden cold snap.

"The lettuce should be well headed and ready to ship by Christmas. Lettuce should be shipped in tight barrels and covered with heavy bagging. Trim off all defective leaves and rinse each head in water in packing. Pack neatly in layers in the barrel, heads upside down and well tucked in, so as to give no room for jostling.

"After the lettuce is out of the way give the cauliflowers a good working over, and then expose them to the full air on every favorable opportunity, so as to get them well hardened to the outer air by the time they begin to get their leaves against the glass, and, finally, by the latter part of February, at least, strip the glass off of them entirely and use it on other frames for tomatoes, cucumbers, or other crops. The cauliflower should be well headed and cut out by the last of March. The cauliflower is naturally a seaside plant and does not reach its best perfection far away from the coast. They require a very rich soil and an abundance of water. The plants in the frames should, therefore, never be allowed to suffer for water, and the glass should be stripped off every warm rain during the winter. If snow falls let it lie on the glass, as it will protect the plants from the cold which is apt to follow the clearing off.

VARIETIES.

"The only varieties we have found worth growing in frames are the Early Erfurt and the Snowball. The last named is the best and most certain heading sort we have ever grown. It leaves nothing to be desired in an early

cauliflower. For growing in the frames with the cauliflower we have found no lettuce better than the strain of Tennis Ball known as the Boston Market Lettuce. When the frames are devoted to lettuce alone the sort called the Big Boston is probably the best. The Black Seeded Simpson is a quicker growing sort of fine quality, but it does not make a close head, and hence does not sell so well. For home use we prefer it to any other. The lettuce known as All-the-Year-Round is one of the best for open ground culture, and for spring planting the Hanson is fine, as it stands warm weather well. But no sort of lettuce is of any value here after warm weather sets in finally."

(See also article on lettuce, page 187.

PARSNIPS.

Like the carrot, the parsnip should be sown early in the spring to ensure the germination of the seed, and as for other tap-rooted plants the ground should be very thoroughly and deeply worked, or the crop will be stunted. A rich, mellow loam, or a black or chocolate sandy soil is best for this plant, although good results can be obtained on a clay soil if it is made rich and mellow by the use of manure and by deep plowing. Wood ashes are a good fertilizer for this crop and should be used where they can be cheaply obtained.

They should be sown in drills 15 to 18 inches apart, in March, and thinned out to 6 or 8 inches in the drills. Work them well and keep the ground clear of weeds through the spring and summer, and they will be ready for use from last of September until the following spring.

For seed, as with carrots, turnips or beets; a few should be left standing in the ground, until the next spring, covering

them with earth or straw in severe weather. They will send up seed stalks as soon as they start to growing. The vegetables named above, as well as cabbages and cauliflowers, are biennials, and seed should be saved each year for a succession of fresh seed. The hollow crown variety of parsnip is the best.

MUSHROOMS.

This delicious fungus plant is found growing wild in nearly all parts of the United States, but is raised in garden culture in prepared beds sown with mushroom spawn, which can be obtained from any good seedsmen in the larger cities, costing usually about 20 cents a pound.

The beds should be prepared in March, November or December. A good size being 3 or 4 feet wide by 10 to 15 long, and these beds must be sheltered from cold and rains by a roof, and the north and west sides may be boarded up, leaving the south or south and east sides open. They can also be grown on shelf-like beds one over the other to good advantage. Fresh cow and horse manure and rich loam mixed together thoroughly, and placed in layers 12 inches thick, in alternation with clay loam 3 inches thick, each layer of manure being saturated with liquid manure and beaten down solidly as it is laid on, form the beds. Two or three of each of such layers can be put on, but good results are obtained where but one of each are used if the proper temperature and degree of moisture is secured. The top layer should always be of good, rich loam 2 inches thick and should be well watered with warm water.

After the bed is prepared cover it heavily with straw or old hay leaving it to ferment ten days, and until its temperature is from 50 to 60 degrees, when it should be planted

with pieces of spawn the size of a walnut, 6 inches apart, all over the bed. In from one to two months after planting, the bed should begin to bear. It must be kept free from all weeds by hand pulling, not by hoeing.

A method of increasing the supply of spawn is recommended as follows: Take two parts of fresh, rich horse manure, two parts old do, one part cow manure, two parts rich loam and mix thoroughly, using barn yard leachings to moisten, making the whole into a thick paste. Spread this out and beat it down to from 2 to 3 inches thick. When partially dried cut into pieces 6 or 8 inches square and partially dry, turning them frequently. When in this half dry condition insert two or three pieces of spawn the size of your thumb into holes made in each brick, covering them with some of the same material as that of which the bricks are made. The bricks are then placed in compact piles one on the other, spawn side uppermost, and are covered thoroughly with warm horse manure, wetting the pile with warm water, care being taken that the heat engendered is not over 70 degrees, or the life of the spawn will be destroyed.

The spawn will in a few days diffuse itself, growing all through the bricks, which can then be stored in a cool, dry place and will retain their vegetative power for years. Mushrooms cannot well be shipped to market, but if grown in quantities, must be sold in a near-by city, or they can be sealed up in tin cans as the French put them up, or made into catsup and bottled.

PEANUTS.

On light, sandy or loamy soils the peanut, or as the native Southerner calls it, the "goober," produces its best crops.

The ground should be deeply and thoroughly broken, and a top dressing of manure, lime, marl or ashes are each and all excellent, increasing the yield of this crop, preventing the formation of empty pods or "pops," as they are termed, but on any piece of fair, loamy or sandy upland, they will with proper culture be found to do well.

The fruit, or nuts, are formed under ground on the roots, the flowers above on the stalks, the same as those of a potato. There are several varieties, the best known being the ordinary Virginia or Carolina, and the Spanish, which is a smaller kind not good as a market sort, but very productive and excellent as food for hogs.

An early planting is desirable, as this crop takes a long time to mature, still a crop may in some seasons be made even when they are planted as late as July 1. It is better, however, to plant as early as the last of March or in April, putting them in hills 2 feet by $3\frac{1}{2}$ to 4 feet apart, planting several peas in a place to insure a good stand, thinning out finally to one or two plants in a hill.

They should be well worked with the plow, but earth should not be thrown upon the plants as is recommended by some planters, the yield being reduced by this treatment, the re-rooting of the branches taking from the strength and yield of the plant.

In harvesting, plow them out with a broad shovel plow, stack them in piles to dry out, shake off the sand and soil,

and beat them out into a barrel. To clean them thoroughly run them through a fanning mill, or revolve them in a drum made with strong plank ends, and slat sides, tacked a little way apart, which will remove all sand and clay and make them bright, clean and marketable.

The vines are very valuable as hay, and if well cured stock are very fond of it; in fact it is equal to the best of clover. This should be carefully cured before the time of frosts, and care should be taken to keep it from heating while in a green state, which it is very liable to do if piled too compactly. After harvesting turn in your hogs, who will see that none you have overlooked are lost.

Good, sound, clean peanuts, put up in good burlap sacks, are worth from \$1 to \$2 per bushel, and find ready sale in the larger cities, the leading markets being New Orleans and Cincinnati.

The ordinary yield is from 50 to 80 bushels per acre, and is a much better crop for the Southern farmer than 5 cent cotton.

OKRA.

Okra while not a shipping vegetable is a plant easily raised and affords to those who are fond of it a vast amount of mucilaginous food and is an excellent ingredient in soups, the famous gumbo soup having this as one of its principal ingredients.

Okra does well on almost all sorts of soils. Plant it in the spring when all danger from frost is over, in drills 3 feet apart and thin out to 18 inches to 2 feet apart in the rows. All of the pods should be cut off as they form (save two or three that may be left for seed) or the plants will soon stop bearing. It will be found a good plan to cut back half of the

canes in midsummer (say the 1st of July) to two-thirds of their height. They will then send out new shoots, blossoms and fruit, and their bearing season will be prolonged until frost comes.

PEPPERS.

It may be well to raise a few plants of this family in every farmer's garden. The hottest and strongest are the Cayenne and the Chili varieties; the milder sorts being used for pickling, and as a salad the Bell and Spanish sorts. Sow in hotbed early, or in open ground about the middle of April and transplant to the garden when $2\frac{1}{2}$ or 3 inches tall, putting them in rows 2 feet apart and 1 foot to 18 inches apart in the rows, working them as necessary to keep down weeds and mellow the soil.

The use of this vegetable is said to be beneficial as a corrective of bowel disorders and stimulating the secretions of the liver, and of value in the cure of malarial diseases, and is also esteemed as conducive to the health of chickens and other domestic fowls, a dose of it given occasionally cut up in their rations being highly recommended.

LETTUCE.

This plant is grown so finely and easily at the South, that if not raised as a shipping product it deserves a place in every farmer's kitchen garden.

The best plan to have it early is of course to sow in hot-beds, cold frames, or in a greenhouse in January, or even earlier in the Gulf States. It can be transplanted to open ground from the 1st of March to the 1st of April.

One ounce of good seed will produce from 3,500 to 5,000 plants. When they are 2 inches high they should be

transplanted to other beds giving them 3 or 4 inches of room each way, watering them frequently. As soon as they have well filled these spaces, take out two plants out of three, leaving every third plant to stand and mature where it is. These if well worked and watered, and given plenty of light and air covering them only in cold, freezing weather, will make very early heads. As we have said the main crop can be gotten into open ground from 1st of March to 1st of April. The soil for lettuce should be tolerably rich and light, though it is not necessary that it be quite so rich as for cabbages. Frequent working is very beneficial and necessary to secure good large heads. They should be set 12 inches apart each way.

With cheap transportation charges, coupled with rapid transit, very early and well grown lettuce should be profitable as a shipping crop. Where a Farmers' Shipping Club has been established and is in good working order, and through carload rates or special express rates are secured, there certainly is good money to the intelligent truck farmer in very early lettuce. It might be shipped at the same time and in connection with celery, asparagus, radishes, early onions and cabbages (See also cauliflower and lettuce on page 179.)

SALSIFY, or VEGETABLE OYSTER.

This plant is raised for its long tap root, which when stewed and served with a dressing of milk, butter, salt and pepper, or cut in thin strips and fried in batter is much relished by many persons. It has somewhat of an oyster-like taste.

It likes a deep, well worked soil, and it is well in sowing to put a few turnip rooted radish seeds in with them as when the young plants first come up they are so small and so near

the color of the ground it is hard to locate them. After one or two workings however, they grow vigorously and the radishes should be pulled out and the salsify thinned to 4 inches apart in the rows which should have been drilled 12 to 15 inches apart. We do not consider this to be a shipping vegetable, but as it is ripe late in the fall and during the winter when most other vegetables are out of season, and as it will stand in the open ground during the cold weather in the South, it is of value for the kitchen garden.

Seed of this vegetable can be easily saved by leaving a few plants to stand over, and removing the ripened seeds from time to time for all do not ripen at once. They should then be well dried, rubbed out and stored in paper bags for the next spring's sowing.

KOHL RABI.

This plant belongs to the *Brassica* or cabbage family. Its chief value is the early date at which it matures. The part eaten is the globular enlargement of the stem which forms above the ground and is turnip like in form, and somewhat in flavor, but is more delicate than either the turnip or cabbage.

As to culture, soil, etc., the same directions given for the cabbage should be followed for kohl rabi, excepting that it can be set much closer together, 10 to 12 inches being far enough apart. They should be frequently worked the same as cabbages, but care should be taken not to hill them up or to lodge soil in the heart of the plant as this prevents them from forming properly. It is not thought that this vegetable would pay as a shipping product, and when cabbages begin to head they are generally preferred.

EGG PLANT.

To raise the plants, hotbeds or greenhouse culture are almost imperatively necessary. They are a native of the tropics and require early planting and a long warm season to give best results, so that it is not worth while to attempt to raise plants in open ground.

Sow under glass in January or February, covering the plants an inch deep in drills in rich, fine loam soil; watering them in the drills before covering. The temperature should be kept higher than for most other seed, and on this account it is best to put them in beds by themselves, keeping sashes closed and the air humid until the seed vegetate. As the plants are exceedingly tender, care should be taken to give them air only on warm days, and to protect them from chills at night.

Fight off the small flea insects which sometimes trouble the young plants with insect powder, soot, finely powdered tobacco, scotch snuff, etc.

When all danger from frosts and cold nights is gone, say from middle of April to first of May, transplant them to very rich open ground, setting them $2\frac{1}{2}$ feet apart each way, watering them well with tepid water in which a little guano or manure has been stirred until they are well established. Work the ground thoroughly, drawing the earth up about the roots.

There are two main varieties, the purple and the large olive, the first being the best known and selling the best. There is no reason why this vegetable should not be a good shipping product. It sells well in all large towns and cities, North or South, and usually brings remunerative prices.

The mode of cooking is to pare, slice, salt, then after washing the salt off, dip in batter and fry, using a little lard on the griddle, to a light even brown color. Many people are very fond of them cooked in this way.

(W. F. M.) "This crop is annually growing in importance as a vegetable for Northern shipment, the demand for them having increased rapidly for years past. The egg plant is a tender tropical plant, belonging to the same natural order as the tomato and the potato. It is one of the plants that demand, for the best success in securing an early crop, that the seed be sown early in a greenhouse or hotbed, and it must be kept growing thrifitly in a good, uniform temperature until the weather is permanently warm outside. Any check in its growth will result in stunted plants and a worthless crop.

"We always sow the seed of egg plant in shallow boxes on rich compost in a greenhouse where a night temperature of fully 65 degrees is maintained. The seeds are sown about the middle of February, quite thickly in the boxes, and as soon as up, and even before the second pair of leaves are developed, they are carefully lifted and transplanted into other boxes of fresh soil about an inch or more apart, and set a little deeper. If left standing thickly where they germinated the 'damping-off fungus' will often destroy the whole in a single night. When the rough leaves are well developed the plants are again transplanted into 3-inch pots and set on the greenhouse benches. Later on they are shifted into 4-inch pots in the same house. In April, when the tomato plants that have been hardening off in the cold frames, are transplanted to the open ground, some of the egg plants should be transplanted into the frames, putting two plants under each sash. These are then to be kept protected from all chilly

weather by drawing the sashes over them at night and on cool days, for the egg plant will not endure any chill. The remainder of the plants should be kept in the greenhouse until the soil is permanently warm in May.

"Those set in the frames will enable the gardener to keep up a profitable use of the sashes and will be the earliest to give a crop, the sashes being removed from them when the weather is finally settled. Treated in this way the fruit can be had of marketable size in June, and any egg plants shipped during June and July will usually bring a paying price. They are marketable as soon as they attain the size of a small Jenny Lind cantaloupe, or from 1 to 3 pounds weight. The fruit should never be pulled, but carefully cut with a sharp knife and packed in well-ventilated barrels or barrel crates. It is an expensive crop to forward, but the profit depends on the earliness of the product and they will pay well for the extra expense.

"The soil for egg plants should be light and warm, and as rich as it can be made. Low, wet and cold land will not make egg plants. The crop will be in exact proportion to the rapidity of their growth. Land that has been the previous year in the early Irish potato crop, and heavily fertilized will be a suitable place for them, provided that when the potatoes are off the land it is at once sown in peas, which should be allowed to die on the land, and crimson clover seed sown among them in September. The clover and dead pea vines should be deeply plowed under in April and the surface put in good order for the egg plants.

"The land should be marked off 3 feet each way, and a shovel full of manure, or a good handful of high grade fertilizer, be well mixed with the soil at each check, ready for

setting the plants in May. The after-cultivation should be shallow and frequent, and a dressing of nitrate of soda during their growth will materially forward them. The Colorado potato bug is very fond of the egg plant, but in the early stages of its growth can be easily kept down by spraying with Paris green mixed with water. Later on, as the fruit forms, hand picking must be resorted to. Much work can be saved by examining the under side of the broad leaves for the orange-colored patches of the eggs of the insect, and crushing them with finger and thumb. The plants are also subject to the Southern blight, which is so destructive to the tomato at times. This disease shows itself by the sudden wilting and death of the plants just as they are coming into fruit. The exact cause of this disease is as yet not fully determined. Some good authorities consider it the work of bacteria within the plant, while the Florida Station states that it is caused by a higher order of fungous growth, with an external mycelium. If this is the case, a spraying with Bordeaux mixture should be effective against it. We tried this the past season on part of a plat of tomatoes at our station, but as the disease did not make its appearance on the untreated plants we are still uncertain as to the efficacy of the remedy. Next season we will try the same on plants set where the disease was bad the past year and repeat the treatment.

"There are several varieties of egg plants, but only two of them are commonly grown. These are the New York Improved and the Black Pekin. The last named is early but not prolific and the fruit is smaller than the first, which is really the only sort worth growing. Even this rapidly deteriorates from careless saving of the seed, and while, as a rule, it seldom pays a gardener to attempt to save seed, it will

always pay the Southern gardener to select some of the finest fruits from some of the most prolific plants for seed. The best strain of these seed we are acquainted with is that largely grown among the Norfolk gardeners as Tait's Improved New York Purple."

WATERMELONS.

The raising of watermelons or muskmelons should not in the opinion of the writer be attempted as a business on clay soils. On rich sandy or loam soils, or even on poor sands, good crops can be raised, but though some farmers, by taking extra pains and with increased expense, succeed in getting fair crops on clay soils, the fact remains that the true home of the melon family is the alluvial, black sandy, chocolate sandy, and light sandy and loamy soils.

Break the ground deeply, then lay off by throwing four furrows together 10 feet apart. The hills should be 10 feet apart on these ridges and a half bushel of good well rotted manure is a splendid addition to each hill. Plant in the extreme South the last of March; in the northern Southern States the 10th of April, unless you are prepared with glass top boxes to cover the plants on cold nights, in which case the planting can be done two weeks earlier. It is well in any case to replant in the same hills every week so that if the first planted fail the later ones will come on, and an early stand be secured. Another good plan is to raise the plants under glass on reversed sods as recommended for early sweet corn on page 171, transferring these to open ground when all danger from frost is passed. Luke warm liquid manure is excellent for stimulating the growth of melons.

Plant ten or twelve seeds in a hill thinning out at last to one or two. Deep working is fatal to this crop; the ground should be worked faithfully, laying the vines carefully out of the way, but all working should be very shallow, using a scooter plow with heel sweep, light cultivator or horse hoe. When the vines cover all the ground the cultivation should cease, and all that remains to be done is to remove all imperfect or misshapen melons, and if the vines have not acquired a vigorous growth and yet are setting fruit this should all be removed, thus giving the plants opportunity to get a vigorous growth, after which the fruit will come on rapidly and will be much finer and larger than if the first setting had been allowed to mature. If large melons are wanted it is recommended to thin out the crop, but in no case to pinch or cut back the vines. We know there are many who advise pruning back, but the evidence seems to be in favor of the contrary course.

Melons are a splendid shipping crop and if proper freight arrangements can be made *before the crop is raised*—please note this, we say *before the crop is raised*—good profits can be obtained, a very large business done and money made.

After the watermelon crop is ripe there is usually plenty of time to raise a crop of cowpea hay or millet on the same ground. The first is the preferable crop as it enriches the ground it is grown on and leaves the soil in fine condition for plowing for the next season's melon crop.

(W. F. M.) "The watermelon crop has of late years attained great importance in some of the Southern States, not so much among the market gardeners proper as among growers on warm, thin sandy soils that are well adapted to this crop. The extensive culture of watermelons in southern

Georgia has so occupied the early market that they are not so profitable to growers in the upper South, but they can still be made to pay reasonably well on cheap lands.

"The best soil for the watermelon is a high, warm, sandy soil, though good, but later crops can be grown on mellow bottom lands. Land that has been newly cleared, or an old field that has been lying out for some years, are usually favorable places for the melons.

"The usual method of planting, after the land has been well prepared, is to lay it off with the plow in checks 10 to 12 feet each way and plant at each intersection. The furrows are enlarged at the crossings so as to make a wide hole in which the compost is placed. The compost made of well rotted manure and leaf mold from the woods should be prepared during the previous winter. Two or more shovelfuls should be placed in each hill, and a good handful of high grade fertilizer should be well mixed with the surface of the hill before planting and lightly covered with soil. On the flattened surface of the hill made over the manure the seed is planted. As earliness is important, the planting should begin as soon as there is a chance for the seed to grow, making successive plantings a week apart of a few seed each time until a full stand is secured. It is well worth while to sacrifice some seed to secure the earliest stand. When a stand is secured and the plants are strong they should be thinned to two plants in each hill and the soil well loosened around those that are left. The cultivation should be rapid, before the vines get to running, by throwing furrows to the plants with a light plow. The vines should never on any account be disturbed or moved and all cultivation must be in advance of their extension.

"An experienced man can easily detect a ripe melon as soon as he looks at it, but if, on turning the melon over, the under side is yellow and blistered it is certainly ripe. A ripe melon will sound hollow on thumping in the early morning, but when they are heated in the sun a green one will sound as ripe as a ripe one. The varieties of watermelons are very numerous, but for shipping we want, above all, a melon tough enough in its rind to stand the handling to which they are subjected. No variety yet grown has become so popular among market growers as the Kolb's Gem. This is a round melon of medium size, with a thin but tough rind and handsome, bright red flesh. It is, however, not of fine quality or flavor and the flesh is stringy and coarse, but its carrying quality and handsome appearance makes it the most profitable sort grown. The Jones melon, a recent introduction, is similar in shape to the Gem, of larger size and far better quality, but the brittle nature of its rind will forbid its use by shippers. The McIver Sugar melon, raised by Colonel E. R. McIver, of Darlington, S. C., is, in our opinion, after three years' observation, by far the best watermelon in cultivation. It is an oval shaped melon, striped light and dark green, and is the most uniform and true to type of any melon except the Kolb. In quality it is far superior to the Kolb, or any other sort we have tried except the Jones, and is fully equal to that. It promises to make a fine shipping melon and will supersede the Kolb when better known.

"The same blight that attacks the tomato and egg plant attacks the watermelon, and it may be that spraying with Bordeaux mixture will prevent it, but we cannot as yet state this definitely."

PUMPKINS.

The pumpkin is a good, homely plebian plant; that is to say it will grow well on almost any kind of soil, on hill or valley lands, on sand, clay, or rich loam. Of course like any other plant it does best where the soil and surroundings are favorable, but it does not demand as rich soil as melons or cucumbers. Pumpkins do very well planted in the hills with corn, but in any case should not be set closer than 10 or 12 feet apart and but one plant should be left in a hill. Cultivate them well, keeping the ground about them mellow until the vines cover the ground but do not hill up the dirt over the roots.

It has long been claimed that pumpkins when planted near melons, squashes, etc., mix and deteriorate the quality of the progeny of these plants, but recent tests made at Experiment Stations tend to prove there is little danger of such a result. At any rate pumpkins, melons and cucumbers are so distinct and individualized it is not thought that they will cross. Perhaps the squash family may be more susceptible to hybridization from the pollen of the pumpkin.

As is well known the flesh of the pumpkin after having been boiled to a thick pulp, is used with milk, eggs and a little spice and sugar in the making of pies of the custard sort and is very much relished in the fall and winter by almost everybody. It furnishes excellent and plentiful "pie timber" to the frugal farmer's wife. A greater value is found in this fruit as a food ration for cattle and hogs, both being very fond of it, and from its richness in sugar and of its seeds in oil, it is a very nourishing and fattening food.

Being so easily and cheaply grown it will be found a very economical food crop, and succeeds admirably at the South. Pumpkins keep well all winter if stored in a cool, dry place such as a frost proof outdoor cellar or fruit house.

The meat of the pumpkin is often preserved by being cut into long thin strips and dried in the sun or by the fire, afterwards being soaked until soft and used for cooking purposes as wanted.

The best sorts are those which have the thickest meat, such as the "Tennessee Sweet-Potato Pumpkin," or the "Connecticut Field." In saving seed select those having the thickest flesh and growing nearest the roots of the vine. Three to five pounds of seed are required to plant an acre in hills, costing from 50 to 75 cents per pound.

SQUASHES.

Squashes are of two main sorts the summer or bush varieties and the winter keeping or running kinds.

Either sort may be planted in almost any kind of good, rich soil, which has been heavily manured with light, well rotted manure, and has been thoroughly broken up and made into hills raised 3 or 4 inches above the surface of the bed. Let these hills, when required for bush squash be 4 feet apart or if for running squashes 5 feet, and let the crowns of the hills be a foot across and make them a little dishing to the center so that in a rainy time they will hold an inch or two of water. Plant 10 or 12 seeds in a hill so as to be sure of a stand, and remove surplus plants from time to time so as to leave but two or three plants of the bush sorts, or one or two of the running kinds.

Do not work them or disturb them until the rough leaves come, then keep the earth about the plants loose and clean. Squashes are very tender and should never be planted until all danger from frost is past, but as they can with care be transplanted easily, they may be started in a hotbed or greenhouse as we have directed for cucumbers, and afterwards removed to the hills. This, however, had better be done in a wet time, or in the cool of the evening, pouring water about the roots before covering them in with dry soil, shading them from the hot sun the following day.

Of summer varieties suited to the South we have the *white* and *golden yellow scalloped* or *patty pan squashes*, and the *yellow crookneck*. The giant summer crookneck, lately introduced, is as early as the old, smaller variety, about twice as large, continues long in bearing, as good in quality and a fine market sort. Both of these latter sorts are characterized by their bright yellow color and rough, warty skin.

Of winter sorts we have the old-fashioned large Winter Crookneck and the Mammoth Chili. The Hubbard, so popular and productive at the North, we have never had any success with, but never failed to raise abundant crops of the Winter Crookneck.

In cooking squashes, especially the winter sorts, our better half finds steaming them much preferable to baking or boiling. When well cooked by this method they are excellent. It is not necessary to peel them, the rind is very hard, cut them in convenient pieces and put them in the steamer, flesh side down, and when cooked scrape out the meat.

CANTALOUPES.

This variety of melons is a remunerative crop for the truck farmer where soil and shipping facilities are favorable. All that we have said under the head of watermelons, applies with equal force to cantaloupes, excepting that the hills need not be so far apart, 6 feet each way being sufficient.

The globular, rough-coated, green meated sorts are the sweetest, most highly flavored, and ship and sell the best. They can be packed tightly in crates 16x24x12, or in barrels, with sacking nailed tightly over the tops, the former being much the best way.

(W. F. M.) "The chapter on cucumbers will apply equally well to this crop, and it is not necessary to repeat it here. The varieties in the catalogues are very numerous and new names are added annually, but the truckers still adhere mainly to the older sorts. The main variety grown by our truckers is the Jenny Lind. This is a small, green fleshed, netted melon, well known and popular in the Northern cities, and is about the earliest of any. In high quality the Emerald Green, a green skinned sort, with orange colored flesh, in our opinion stands at the head of all melons. It is, however, much later than the Jenny Lind, and is apt to crack badly in wet weather, and has not become so popular with growers, but for home use it is unsurpassed. The Hackensack and the Anne Arundel, or Acme, are grown to some extent for market, but more Northward than in the South."

MUSTARD.

Sow mustard almost at any time of the year and on any kind of good soil at the South, and a good return in an excellent crop of greens is sure to be the result. If you want to keep your ground free from weeds, it is best to sow mustard in drills, and work it, but it is quite common to sow it broadcast, and the crop is about as good one way as another, unless the season should turn out to be very dry, in which case that in drills, well worked does much the best.

Mustard is principally used for "greens," boiled with a little salt and a small piece of bacon, and dressed with vinegar and a little pepper. It is esteemed a very healthful dish for early spring. For a succession in the middle South sow every month in the year excepting December, January and February.

SPINACH

Is eaten for greens in the early spring, the same as mustard. Sow in October, and continue to put seed into the ground all the winter and spring months excepting February, when the weather is usually too severe for the plant to make headway. Plant in rows 18 inches apart and thin out to 6 or 8 inches in the row. A mellow rich loam is best for this plant. Work thoroughly, keeping the ground mellow.



PART IV.

❖ Fruits ❖

APPLES.



THE late Dr. John A. Warder, recognized as the leading authority on apple culture in North America, gives preference to the selection of a Northern slope, with light, rich porous soil, for an apple orchard, but states that some varieties do best on one kind of soil, while others thrive on another totally different. He also states that unsuitable soils and situations may often be so modified by the horticulturist as to render them useful and productive. These modifications may be effected by artificial drainage, supplying lacking chemical constituents in the soil, etc.

Most all of the Southern States abound in excellent sites for apple orchards, and tested varieties are successfully grown, from Virginia clear around to Arkansas on the plateaus and higher lands.

We cannot too strenuously urge, that only those varieties be planted in any locality which have proved themselves adapted to similar soils, seasons and climate. There are now

plenty of such well tested sorts, many of them being long keeping, winter varieties that are known to be regular bearers, healthy and profitable at the South.

A list of apples recommended for Southern culture will be found on another page.

After the selection of a suitable site for an orchard, the next point is the clearing of the land of trees, stumps and rocks; then should come a deep and thorough plowing, and on most soils a subsoil plowing will be found beneficial. The ground should be deeply and thoroughly worked, and if the land is not rich enough to grow a good corn crop, a top dressing of manure should be given to bring it up to that standard. Green crops, such as cowpeas or clover, should be plowed under, while applications of ashes, lime and salt will generally be found beneficial. Care must be taken, however, in the application of mineral manures to all kinds of fruit trees, especially to young trees; a too liberal application of leached ashes, say 1 bushel to a tree, has been known to kill out a young orchard completely. These substances should be spread lightly over the surface and should in no case be heaped up about the trees or in fact put too near them.

Dr. Warder says of manuring: *“Clover is an invaluable assistant. Its long roots pierce deeply into the soil, bringing up from below hidden treasures, which are left in the upper layers, modified by the digestion of the plant, and by new chemical changes and combinations rendered fit food for succeeding crops. * * * Stable manure and composts will seldom be required in lands that have not been nearly exhausted, and therefore unfit for any orchard. In case it becomes necessary to use such a field, the manur-

*Warder's American Pomology; Apples, page 220.

ing should be done all over the surface, and a crop of clover should be grown and plowed in before planting the trees; upon no account should fresh stable manure be brought into immediate contact or close proximity with the roots of the young trees."

Speaking of and for the South, we recommend, that where the land is poor, but is ready for sowing in the fall, a crop of crimson clover be raised, which should be plowed under the following spring, when the land should be gotten in condition and sowed to cowpeas, which will be ready to plow under in September, and the ground will then be in good condition for the planting of the orchard in November.

Large holes filled with manure, or with a few spadefuls of manure thrown in, in which to plant the young trees, are an abomination and a snare. After your whole field is enriched as above, by the crops you have raised upon it, lay off your orchard, setting poles or flags to indicate where the first row of trees shall come, and plowing deep double furrows along that line. Light cross furrows are then plowed at the proper distance apart, and at the intersections strong stakes about 4 or 5 feet long are firmly driven, marking the points where trees are to set, or rather the trees are set just north of each stake.

These stakes are not designed to support the trees in any way, but to mark the place to set the trees, and afterward to show where they stand, and enable the plowman in cultivating the ground between the rows to avoid striking the trees with his whiffletree.

In planting, set each tree a very little deeper than it stood in the nursery row, that is, so that the neck or collar of the tree is just at the surface of the ground.

The earth should then be tramped solidly around the tree upon the roots, and the stem inclined slightly to the southwest, the direction from which the prevailing winds come at the South.

We recommend to shield the trees from "sun-scald" with two short pieces of board 6 to 10 inches wide nailed together gutter fashion, sharpened at one end, and driven into the ground on the south side of and near to the stem of each tree, forming a shade from the sun, both in summer and winter. These gutter-like shades should only be long enough so that when the sharpened part is driven firmly into the ground, the top comes just up to the first branch or live bud of the young tree. If these sun shields are put up by each tree, the marking stakes may be omitted as these will serve instead.

Before each young tree is set out it is well to immerse its roots for a second or two in a warm bath of kerosene emulsion, to kill the root lice of the woolly aphis family, should any be upon them.* This emulsion can be used as hot as 100 to 120 degrees if the young trees are only dipped into it *for an instant*, and taken right out again.

In a recent conversation with Hon. W. G. Vincenheller, commissioner of agriculture, etc., of this State, he strenuously urges, that if the young trees after being set in the orchard, are regularly and thoroughly worked all through the hot weather in the summer months, the soil being kept mellow, and a healthy growth and development kept up, no sun scald need be feared. He insists it is in the summer, and not in the winter months, that this trouble comes on the trees; and that thorough culture of the soil insures the health of the tree in this, as also in almost all other respects. A

*See Woolly Aphis on another page.

few workings in the spring are not enough, this treatment must be continued all through the summer, and the soil must not be allowed at any time to become baked and hard.

There is good, sound reasoning in this, and we cannot too strenuously urge the orchardist not to neglect his trees, and conclude that the few workings when the crops are cultivated that are growing in the orchard in the spring and early part of the summer, are sufficient.

The authorities usually recommend that apple trees be set 30 to 33 feet apart, but as some varieties do not grow as large as others, and if set so far apart will never cover the ground, and as it is contended by some that the shade one row gives to the next, if they are set closer, is an advantage, it is recommended to set them as close as from 20 to 25 feet. If set 25 feet apart, a peach or plum tree can be set between the apples, each way, which coming to maturity earlier, and being of smaller size, do well and bear heavy crops while the apple trees are coming into bearing;—then at last, say in twelve or fifteen years, these can be cut away.

As to the shading of the trunks of the trees one by the other, and so preventing sun-scald, this is not practical, if sun-scald takes place in the winter, when the leaves are off from the trees.

There is no remedy for this trouble, in our opinion, so good as the gutter-shaped wooden shields we have described above. When the trees grow older boards can be nailed to the trees on the southern side permanently, the nails will not injure the trees.

PROPAGATION OF FRUIT TREES.

Trees from established, reliable Southern nurseries, can now be bought so cheap, already grafted and ready to set in the orchard, that the majority of farmers and fruit raisers will prefer to get them in this way. Some persons, however, may choose to raise their own trees, and for their benefit we give a few short directions.

There is no mystery and very little trouble in raising grafted fruit trees; it is a very simple operation. The first point is to secure scions from the varieties suited to your locality. If you know of any orchards or bearing trees in your neighborhood of the varieties you wish to propagate, and you can readily obtain scions from them, you are in condition to go ahead, but if you cannot procure good scions (which are small shoots, or twigs, of the year before's growth) you had better purchase your trees already grafted, from some good nurseryman.

These scions should be cut in the autumn or winter, before the buds have swelled, but not when the weather is cold or frosty. They should then be packed at once in moss or sawdust, the latter being preferable, and stored in a cellar or cave; or they can be buried in light, loamy or sandy soil that is not wet, or having water standing on the surface. When taken up for use, the sand and earth should be washed from them, as grit or sand will interfere somewhat with cutting the scions properly, and will dull the knife.

It will not pay you to depend on seedling trees, either of apples, peaches, or other fruits, for while a few grown from the seed may come true to the parent tree, or prove to be of value, the great majority will produce greatly inferior

fruit, and if you set out your orchard with such trees, in six or eight years, when you should be getting good returns you will have to have the trees grafted all through their tops, at a considerable expense, delay and trouble.

The first thing in raising young trees then, after you have found that you can procure *scions* (or cuttings) of good varieties, is to grow your *stocks* from the seed.

GROWING THE STOCKS.

Any good seed will do, and this may be procured in the case of apples, from the fresh pomace at a cider mill, or can be saved from such apples as are used by the family in cooking or drying, or can be bought of some dealer. These should be sown very early in the spring, or in fact, here in the South it is best to plant them in February, and as soon as they are taken from the fruit, not letting them get dry and hard.

They should be planted in good, rich, deeply worked soil, in beds, just about as you would sow onions, and a top dressing of well rotted manure will be found advantageous in keeping the ground moist and friable. Care should be taken to keep chickens entirely off from these beds, as they are very fond of these seeds, and if they get a taste of them will scratch up and eat them all.

Sow them in rows that are about 18 inches apart, and if you have plenty of seed, sow it about as thick as you would onions; that is to say, about an inch apart in the rows. If you get a good stand thin them out to about 6 inches apart. In sowing the seed, let it only be covered deep enough to insure its being kept moist; a depth of $1\frac{1}{2}$ to 2 inches being generally enough to secure this. Peach and plum stones should be covered somewhat deeper, and planted in the fall,

that the dampness and freezing of the ground may cause the stones to split open.

These young trees or stocks, as they are called, whether of apple or other fruits, should be taken up in the fall, their long tap roots being carefully dug up, and the vigorous ones packed away in sand or sawdust, in a cellar or other convenient place, or heeled in the ground out of doors to remain until any time during the winter when the scions can be grafted into them, or rather into their roots.

ROOT GRAFTING.

This is the common mode of procedure at present. In former days whip grafting was practiced, the stock being cut off in a sloping manner a few inches *above the ground*, and the scion of about the same size, cut also sloping, bound tightly upon it.

Now, the universal practice is to make the splice upon the *root* of the stock, and in doing this, nurserymen use either the entire tap root, or, as is the more common custom, sections of the root; cutting each tap root into about three or four pieces, and grafting a scion into each portion. Some growers contend that the whole root plan is much the best, others as strenuously insist that piece roots are just as good, if not better. There seems to be no doubt but that either do well, one in fact just as well as the other. The main points to be secured are a vigorous stock or root, a healthy scion, a good splice or graft forming a good union of the two, and then good soil and culture with good drainage. These points secured, you will have good trees, whether on piece or whole roots.

HOW THE GRAFTING IS DONE.

Any convenient time in the winter, bring your stocks and scions into some comfortable workroom, your kitchen will do nicely. Now with a *sharp* knife trim off all the small fibrous roots from the tap roots; cut off a piece of this root, say 4 inches long; cut the top of it to a long slope, and in the middle of the slope cut a gash down through the middle of the root, say three-fourths of an inch deep. Cut a section of a scion, say having three or four buds on it, in the same sloping manner, and with a corresponding gash in the middle of it, and fit the two together, letting the lip of the slit of one interlock with the lip of the slit of the other, pressing them tightly together, and then winding and tying them with a few turns of cotton twine. Some persons use soft grafting wax upon the twine, which tends to hold it more firmly in place, but the expert nurseryman does not take this trouble, as the uncovered twine is found to do well enough.

If preferred, a whole tap root may be used for each scion (the fine side-roots having been cut away, as these small lateral roots are always found to wither and decay), but commonly, as we have said, three or four cuttings are made from one root.

In this work, which can always be done in a comfortable place indoors, a division of labor can be had; one trims off the small rootlets; another cuts the root sections, giving them the proper slopes and gashes; a third person cuts the scions to correspond; while a fourth fits the two together and ties them.

If it is not desired to set these young trees at once in the ground, they should be stored in a cool, dry place covered

with moist, but not wet sawdust. If, however, your ground is ready, deeply plowed and pulverized, they will do fully as well planted at once in the nursery rows, being set with a dibble so that the top bud may be just above the ground, and the soil tramped down about them well, which aids in the retention of moisture.

It will be noted that we say plant "in the nursery rows." This is undoubtedly better than to set them at once where you desire them to stand in the orchard, as they are at first such little things, only about 6 inches long, they are liable to be smothered or lost in the crops that may be cultivated on the land, even though stakes be driven near each tree, as recommended on another page.

If set in nursery rows the first year, in good soil well cultivated, and *weeds kept down*, the surface always kept mellow, the young trees will have attained a much better growth than they would have done set in orchard ground and only partially worked. They should at the close of the year have attained a growth of from 3 to 5 feet, and be ready then for removal to their permanent position in the orchard.

BUDDING AND CLEFT GRAFTING.

These methods of improving the quality of our fruits are now so seldom resorted to it is hardly worth while to spend much time in describing the processes.

It is such an easy matter to raise a young root-grafted apple, peach, pear, or plum tree, and in the South such trees come so early into bearing, probably budding and grafting will seldom be resorted to here. Still, as some reader may come into the possession of an orchard, the fruit of which is not satisfactory, and may wish to bud or graft the trees with

wood from some better varieties, we think best to give a few brief directions.

BUDDING.

This is done in the South any time in the summer when the bark will "rise" or "run" well, say from June to October. It is well to cut your buds the same day you wish to use them, but if this is not convenient they may be kept several days in a bottle, tightly corked, not pouring upon them any water. They should be cut, and all incisions made in grafting should be done with a sharp, thin bladed knife. Blossom buds are of course to be avoided. The leaf buds which form at the axils of the leaves are what are required, and of these, those should be taken both for budding or grafting, which while they are plump and well grown, are not upon long jointed, sappy wood. Those preferred are such as grow on well developed, but short jointed, wood; such buds or scions being usually found at or near the ends of the lateral branches. Cut out the bud by inserting the knife one-half an inch above it, then drawing the knife downward parallel with the line of the branch removing not only that portion of the bark in which the bud sets but a small portion of the wood beneath it; the knife is then drawn still downward and out, three-quarters of an inch below the bud. Some persons reverse this, inserting the knife below the bud and cutting upwards. Either will answer, the main thing being a smooth cut with a keen, thin bladed knife, and that the root of the bud be not disturbed. The bud is then ready to be inserted. This is done by making a T cutting in the smooth bark of the young shoot or tree, the perpendicular cut being about an inch in length, the other about three-quarters. The bark is then carefully lifted on the sides of the upright cut, and the lower part of the bud sliver

pressed down into the opening, until the bud is just below the cross cutting, when that part of the bark of the bud sliver above the line of the horizontal cut is cut off to match that cutting, and the bark of the stock is then tied in place, pressing down on each side of the inserted bud; being wrapped about, both above and below the bud with a piece of woolen yarn, thus covering all up with the tightly drawn yarn but the bud itself with the leaf stalk attached, the leaf itself being cut away, excepting a small portion, say an eighth of an inch wide which is usually left upon the leaf stalk. The string or yarn should not be drawn so tightly as to cut into the bark, but only so as to press the bud down well upon the inner juicy bark or cambium, of the stock. If it is desired that the bud shall take the place of the main shoot of a tree and form a new head, it is well to insert it low down upon the stem near the ground, but this can be done only in young trees, say of one or two years' growth.

Buds should be inserted on the north side of the tree or branch where practicable, but if not, they should be shaded from the sun but not from the light, with paper caps, tied above them. If the bud *takes*, and starts to grow, the wrappings of twine must soon be loosened or they will cut into the bark and injure the growth of the bud. Cotton yarn, the inner husks of corn or strips of tough bark are sometimes used in the place of woolen yarn; the material is not so important as that an even pressure be had until the bud has started to grow in its new location.

When it is certain that the bud is growing well, other shoots and leaves above it should be removed gradually, either that season or the next, so that all bearing wood may grow from this inserted bud.

CLEFT GRAFTING.

Scions should be cut for this purpose at the same time as those for root grafting, namely, any time in the very late fall or winter when there is no frost in the wood, and should be stored in a cool, dry place, covered in sawdust or dry soil to keep the air from shriveling them, until spring opens.

The proper time to graft apple or pear trees by the cleft grafting process, is when all danger from frosts is past and the buds upon the trees have begun to swell.

Part of the limbs or upper branches of the trees to be grafted should then be sawed off with a fine saw that will not tear the bark, and with a chisel the stump should be split down about 2 inches, the bark at each side of the cleft being previously cut smoothly with a knife to prevent its being torn.

A narrow chisel or wooden wedge is then driven into the cleft, opening it wide enough to admit the scions on either side of it after they are prepared as follows: A piece of a scion having on it about four or five buds is taken, and the wood is cut away at the lower end from the base of the lowest bud, in a long wedge form, leaving the wood a little thicker on the outer edge of the wedge than on that which is to set toward the center of the limb, so that where the bark of the scion and the stock come together the pressure will be a little greater. The important thing is to have the barks of the two coincide on their outer edges, for unless a union takes place here the sap cannot pass up into the scion and it will die. As soon as the grafts are inserted, the chisel or wedge should be carefully removed and the top of the limb and the cleft should be covered and filled in with grafting wax, or "composition," as it is sometimes called, made according to the formulas on another page.

The next year, if these grafts have "taken" and grown well, cut away other limbs from the tree further down and graft these, and the third year the lowest limbs can be taken off, so that finally the entire top of the tree will be renewed and it will soon become a valuable bearer.

VARIETIES OF APPLES SUITED TO THE SOUTH.

In giving a list of apples suited for Southern culture it should be remembered that different parts of this territory having varied soils and conditions have each their local favorites; the kind that suits one district may not be found to do well in another. Let it be understood then that the following is only approximately correct:

EARLY VARIETIES OF APPLES.

Yellow Transparent; Early Harvest; Red June; Red Astrachan; Yellow June.

AUTUMN AND WINTER KEEPING APPLES.

Ben Davis; Missouri Pippin; Springdale, introduced by Hon. W. G. Vincenheller at Springdale, Ark.; Rome Beauty; Arkansas, or Mammoth Black Twig; Shockley; Jonathan; Winesap; Arkansas Beauty; Ingram; Rawle's Jannet; Limber Twig; Kentucky Red Streak; Huntsman's Favorite; Bailey's Sweet; Hoss (for cooking and fall drying).

For planting in the lowland, cotton belt region, south of the Appalachian and Ozark ranges, we recommend the "Tull Apple," an Arkansas seedling, large, beautiful, red striped, which does not rot on the trees, maturing perfectly, a regular bearer and winter keeper; also the "Yellow Forest," another excellent winter keeping variety, originating in northern Louisiana.

In setting out an orchard for profit it is better to have the trees mainly of but few sorts and those of the varieties that have proved best suited to the locality; the best market varieties and surest and heaviest bearers. The mistake of planting the wrong sorts of trees is a fatal one, as when they come into bearing and your money should be coming back to you, it is a bitter disappointment for you then to find you have made a mistake in the varieties and have to begin all over again.

If you have a large number of trees all of one variety ripening their fruit at the same date, and these of a good market sort, the apple dealer will find it out, come and see you and make a bid for your fruit as it hangs on the trees, and pick, barrel and ship them himself, whereas if you have ten trees each of fifty kinds, he cannot do this, as they will not be ripe at the same time, and you must peddle them out in small lots and sell them as you can.

If on the other hand you wish the orchard to furnish fruit for family use only (a small orchard), it is well to have many kinds ripening in succession.

One thing only should be noted in this connection, and that is, that an entire orchard set with but one kind is not to be recommended. Trees should have those of other varieties set among them so that the blossoms of one will impregnate those of other sorts.

CULTIVATION.

Young apple trees need cultivation just as much as corn does; this can be done to good advantage by planting cowpeas, Irish or sweet potatoes, cabbages, melons, cucumbers, beets or other root crops between the rows, so that while

you are cultivating the one, the other will be benefited; small grains are not recommended.

It is useless to expect good results unless the soil about the growing trees is kept mellow, is reasonably rich, and fungous diseases and insect enemies are watched and fought. Let us then say a few words about the insect

ENEMIES OF THE APPLE.

The first to be mentioned is the *woolly aphis*, from whose pernicious activity many Northern and some Southern apple growers have suffered. Above ground this insect shows up with minute eggs enveloped in a cottony substance upon the bark or in crevices and crotches of limbs. When hatched the insects also are covered with a white, cottony down, and appear as little patches of frosty looking matter, that when crushed by the finger yield a bloody looking thick liquid. These animals do great damage to the tree when in this stage of their being, but soon they enter the ground changing to lice which eat the roots, destroying the tree, if it is not possessed of such vigor as to be able to throw out new roots faster than the aphis can eat off the older ones.

When this destructive insect has fastened itself upon the roots of the tree, there seems to be no effectual way of fighting it, but when it comes up again at breeding time in the spring it should be fought sturdily. Sometimes the insect comes out also late in the fall, just before the leaves fall, and may be seen on the stems and limbs of the young trees like patches of white frost. A wash of kerosene emulsion (see formula further on in this book) should be applied with a brush to the stems and larger branches and roots of the young trees, after which apply melted resin and fish oil,

equal parts, to the exposed portions of the trees, then raise the earth a little around the tree and pack it down tightly with the foot.

Frequent examinations and washings with kerosene or carbolized emulsions are recommended, while any trace of the insect remains.

CODLING MOTH.

When the trees come into bearing, the codling moth will be likely to lay its eggs upon the blossom end of each young apple. The birds will destroy a great many, but others will gnaw their way into the core of the apples, appearing as a whitish maggot.

Remedies—Arsenical solutions (Paris green or London purple) applied by spraying, just after the blossoms fall, to be repeated ten days or two weeks later.

Turn your pigs into the orchard a few months later, when apples that have been attacked fall off, or pick up the apples as fast as they fall, and see to it that the worms are destroyed. Put cloth bands around the trunks of the trees, examining at intervals of seven to nine days for larvæ and chrysalids; a hay rope placed around the tree serves the same purpose. Frequent examinations are necessary in the summer, as the moths hatch out in the hot weather in a shorter time than later in the season, some remaining over winter in the pupæ state, *but probably if the trees are well sprayed no other precautions will be necessary.*

THE APPLE TREE BORER.

This insect attacks not only apple trees, but quinces, and some other members of the family of the *Rosaceæ*, and in some parts of the United States is very destructive to apple trees.

The egg from which this grub comes is deposited by the female beetle early in the spring in the bark of the tree near the ground. It eats through the bark, and the next season eats its way on into the wood, and afterward usually works upward in the trunk a few inches. It may be traced by the dust it throws out, and killed with a piece of wire run into the hole, or by putting into it pieces of camphor, sulphur or other offensive matter, and plugging it up.

To prevent the attacks of this insect, wash the trunks of the trees with melted rosin and fish oil, as recommended on another page, or with a strong lye from wood ashes, or with a preparation of whale oil soap, or soft soap and pulverized sulphur, assafœtida or other offensive matter, mixed with clay and water to the consistence of cream. One application of whichever wash is chosen should be made in the early spring of each year, and if it is washed off, as may be the case with the soap, sulphur and clay preparation, by heavy rains, it should be repeated at once.

Almost all kinds of moths, such as that of the borer and codling moth, may be destroyed by lamps set low in pans, pails or tubs half full of soapsuds, and lighted at night. The moths are attracted to the light and fall into the water. Wide-mouthed jars or bottles containing a little water, sweetened with molasses, hung in the trees, are fatal to great numbers of these pests. The destruction of one moth is equal to the killing of hundreds of borers, they breed so fast.

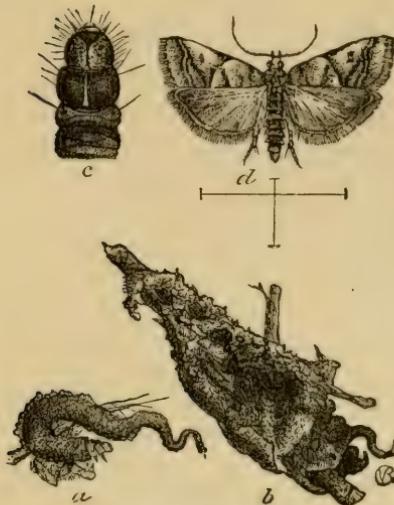
Let it not be supposed, however, that the South is greatly troubled with any of these pests. There are districts in this part of the country where nothing has ever been done to arrest their ravages, and yet where good crops of apples

are produced nearly every year; still in these orchards probably there are some varieties which the codling moth ravages, and other sorts, whose stems are punctured by the borers, and doubtless as orcharding becomes more extended in the South, these pests will increase here, therefore it is recommended to fight them at once.

THE LEAF CRUMPLER.

Professor John T. Stinson writes of this insect as follows:

"The clusters of withered and crumpled leaves which are the cases of this insect, are easily detected and readily recognized from the figure in which (*b*) shows the cases as they appear attached to the limbs. The moth makes its appearance about the latter part of May or the fore part of June. The eggs are laid on trees which will afford food for the worms. The worms are about one-third grown when winter sets in. They construct their places of abode, which are the cases seen in the figure. These cases are long and slender, figure (*a*). The silken threads that hold the withered leaves to the case also hold it securely to the limb of the tree. The larvæ pass the winter in these cases. They can be found in them at this time of the year (December), and are from one-fourth to one-third of an inch in length. Its length when full grown is about two-thirds of an inch.



LEAF CRUMPLER.

a. Larval case; b. Larval case with dead leaves;
c. Front part of larvae; d. Moth, magnified.

As soon as the warm weather of spring comes, and the buds expand the crumpler resumes its activity and commences feeding on the leaves and buds of the trees. This is when it does its greatest injury, the extent of which cannot be well estimated. Its growth is completed during May when it goes into its chrysalis stage to appear during the last of the month or the first of the next as an adult moth. The damage from this insect in some localities is considerable, especially to young trees and nursery stock. In this locality it is found upon the apple, plum, quince, and perhaps upon other trees. Hand picking is the best remedy, as the insect has but one brood a year, and by picking these cases from the trees and destroying them, the increase can be checked."

DISEASES.

The diseases most troublesome to the apple, are the *scab* and *bitter rot*, which affect the fruit, and the *leaf blight*, which attacks the leaves and probably the young bark of apples, quinces, mulberries, and many other plants. Scientists who in these days wisely put everything under the microscope, tell us the

LEAF BLIGHT

which is not the same as the pear blight, this probably being from a different cause, is a fungous growth, having its origin in the yellow viscid masses that hang as parasites upon the branches of red cedar trees. Spores or seeds are carried in the air from these fungi (which in dry weather are shriveled and brown but in a wet time are red, viscous and liver-like), and fasten themselves upon the leaves, etc., of apple and other trees and vegetable growths, producing brown spots or blotches that spread until the leaf dies and drops off in mid-summer. Trees are in this way stripped of their leaves, through which they breathe, and by which they grow. Usually a few new leaves will then start out upon the ends of the branches before frosts come, and so the tree is kept from dying outright, but they are never healthy and of course cannot bear full crops of perfect fruit. In the case of the quince, the fruit itself is often attacked by the disease and it is not certain but that the apple bitter rot is from the same or a like cause.

REMEDIES.

First, cut down every red cedar tree growing on your farm, or if you have only one or two as ornamental trees in your front yard, see to it that every particle of the fungus, which is brown and shriveled when the weather is dry and

of a jelly like red when a rain comes, is removed and burned. To leave even a single lobe of this fungus on any cedar is to jeopardize your orchard. The cedar is one of the most beautiful trees, and we are sorry to condemn it, but it must go unless some remedy can be found which will destroy these fungous growths upon it. If the cedar trees are small, doubtless the blight may be successfully fought upon them by several thorough sprayings with Bordeaux mixture each spring until all trace of the disease is gone. This may be worth trying.

Second remedy. Spray all infected fruit trees with Bordeaux mixture. Spray them several times in the season, both before and after the leaves come out.

SCAB, AND BITTER ROT.

Scab affects the leaves and fruit on the outside, while bitter rot goes to the heart of the apple. They are doubtless both of fungoid origin, and the remedy for either is the same, namely, thorough spraying with Bordeaux mixture (copper salts and lime).

Scab flourishes in cool, damp weather of spring or early fall. In hot, dry weather its growth is checked. Early in the spring pale green spots appear on the young leaves, these increase in size, and later in the summer they become brownish in color and cover the leaves, which curl up and finally die. It is on the fruit, however, that the most damage is done. Apples no larger than peas are attacked and fall off, and those that stay on the trees are small, knotty and misshapen, and have scab spots, rough, brown or black, and cracked deeply into the fruit, which is rendered practically unmarketable, excepting for cider, and often not even good

for that. Careful experiments at different experiment stations and fruit farms, have shown that spraying with Bordeaux mixture increased crops of salable apples from 300 to 1,000 per cent over those unsprayed in the same orchards; and not only so, but the fruit was much finer and by test was found to keep much longer and better than unsprayed fruit.

Bitter rot, which attacks some varieties of apples badly and others not at all, is first noticed as a small, round, brown spot on the side of the apple, appearing usually when the fruit is from half size to fully grown. It soon spreads and in some cases covers nearly the whole apple, which often shrivels up and dries on the tree, but in any case, whether it remains upon the tree or falls off, it is valueless.

To plant varieties not subject to this disease, or to spray with Bordeaux mixture, are the only known remedies.

The apple at the South, however, is no more subject to diseases than in other parts of the United States, and in fact in those parts of it where apples flourish best we think it is not as much so; many orchards are here, bearing fine crops every year, where no spraying or other doctoring has ever been done.

Bordeaux mixture is prepared as follows:

Sulphate of copper (bluestone)	6 pounds.
Quicklime	4 pounds.
Water.....	45 to 50 gallons.

Dissolve the copper sulphate in 4 gallons of hot water in a barrel. Then slack the lime with the same quantity of water in another wooden vessel, and when cool and reduced to the consistency of cream, strain it into the barrel containing the copper solution. Strain carefully so that it may be perfectly smooth and fine, so that it will not clog the sprayer.

For very early spraying (before the leaf buds open) the following, which is very easily prepared and applied, is recommended:

Sulphate of copper.....	1 pound.
Water	25 gallons.

An addition of one-fourth pound of Paris green or London purple (two arsenical preparations) may be made after the apple blossoms have fallen (the bees will be poisoned if this is done while the trees are in blossom). In this way codling moths, and other insect enemies will be destroyed while the scab and bitter rot are being fought. Care must be taken in the use of the Paris green or London purple, as they are deadly poisons.

For using these, and all other spraying preparations a good sprayer is necessary. A good knapsack sprayer can be bought for \$9; or a barrel sprayer at from \$8 to \$25. The cheap bucket sprayers are of no value for orchard use and will only do for a small city lot where there are but half a dozen trees or so. The continual replenishing of the supply of spraying mixture to a small bucket pump increases the labor to such an extent as to make the use of such a sprayer in an orchard almost impracticable. It is better to spend a little more money on the sprayer and have one that saves time and labor so greatly. Every sprayer is or should be provided with a vermoral nozzle, so that a fine, delicate mist may be directed to any part of the leaves or branches, and the mixture, especially where Paris green or London purple are used, should be frequently stirred or agitated to prevent the chemicals from settling.

The cost of spraying materials is not very great; sulphate of copper (bluestone), costs usually about 7 cents per

pound; Paris green, 25 to 30 cents; London purple, 16 to 20 cents per pound.

PRUNING.

Apple trees require very little pruning. The usual course is to cut the young trees back when first planted, to about 24 to 30 inches from the ground, so they may head low. Subsequent pruning has for its object the cutting out of crossing and weak limbs and superfluous growth, in those varieties which have a habit of sending out many branches; or of cutting back those sorts whose tendency is to grow a few long, spindling limbs. In other words, trim so as to secure, as much as possible, round symmetrical tops, that are not too crowded with small branches.

Dr. Warder, in his American Pomology, says:

"First, we prune for shape and comeliness, and for the removal of dead and dying branches in aid of nature, but working in sympathy with her.

Second, we prune for the sake of inducing fruitfulness."

He adds: "*Prune in winter for wood; in summer for fruit.*"

He also recommends to "*trim down, not up,*" by which he undoubtedly advises to shorten in trees rather than to allow them to grow tall and spreading. This treatment, however, must depend somewhat, he intimates, upon the habit of growth of the tree, and we should also say that where crops are to be grown between the rows, this might lead to some modification of the shaping of the trees. Volumes have been written on the subject of pruning, and authorities have different theories, and advise different methods, but it is generally conceded that small limbs and twigs may be trimmed off to advantage any time in the summer when your

knife or fine saw is sharp, or in the winter when the tree is not frozen. Cole, in his American Fruit Book advises when it is deemed advisable to cut off large limbs, to do it in the fall; if done in the spring he found the sap oozing from the wound caused rotten cavities that were very injurious to the trees.

PEACHES.

The peach is said to have originated in Persia, in the same latitude with the middle South, and certainly here it finds favoring conditions of soil, climate and seasons, and bears large crops of delicious fruit. If the Southern farmer has a location suited as to soil and topography for peaches, and a good home market in some large town, or has good shipping facilities to the North, there is nothing that can be made to yield him a better return than a peach orchard set with the best grafted sorts, well worked and cared for.

A location and soil similar to that recommended for apples, will be found desirable for peaches, a northern slope being preferable at the South for both of these fruits, being less affected by droughts, and also retarding the time of blossoming until danger from late frosts is over in the spring.

Grafted trees are preferable to seedlings in raising peaches for market, as the latter cannot be depended upon to give uniform results as to time of ripening, or quality and size of fruit.

The same thorough preparation of the soil, and directions in regard to setting the trees advised for apples, apply to peaches; excepting that the latter can be set much nearer together than apples, some growers planting them as close as 10 feet apart each way, or 435 trees to the acre. Whether set as close as this or not, they should be regularly

pruned back every year, shortened in each spring, to keep the branches stocky and low.

For the first four or five years after setting, cowpeas, root crops, or strawberries, can be grown between the rows, but at a distance of 3 or 4 feet from the stems of the trees.

After this they will shade the ground too much to make this profitable. The ground, however, should be plowed every year (shallow working being preferable) until the trees are fully grown, and if the ground is not naturally rich, it should receive top dressings at times of lime, ashes, ground bone, nitrate of soda, muriate of potash, or *well rotted* manure; applying these not immediately about the stems of the trees, but broadcasting it over the whole surface of the ground and harrowing it in. The best time to make these applications is in the latter part of winter, as the farmer then has time to attend to it, and the spring rains wash it in. If applied late in the summer, they are apt to stimulate a fall growth of immature wood, which does not go through the winter well.

Peaches at the South have a long ripening season, extending from the latter part of May to November, the best sorts ripening in July and August. The earliest peaches have not heretofore been found very profitable for shipment, in fact they rarely ripen satisfactorily, rotting on the trees just before their maturity. This is true of the Amsdens, Alexanders, and Arkansas Travelers, which are almost, if not quite, identical sorts. Southern growers are very desirous of finding an extra early peach of fair or good quality that produces well and does not rot on the trees.

The Crosby, a "frost proof" variety, large, handsome, yellow, freestone, sweet, delicious, with very small pit, is

well worth trying, so also is Clingman's May peach, originating at Homer, La. This is a very early freestone peach, blooms late, large, prolific, flesh white, deep crimson skin, delicious in flavor. It is recommended by the introducer to those wanting a good early peach.

LIST OF PEACHES FOR THE SOUTH.

FREESTONE VARIETIES.

CLINGMAN'S EARLY MAY, Brigg's Red May, June 1; Beatrice, June 1 to 10; Troth's Early, June 20; Foster, June 20; Honey, June 25 (for the Gulf States); Crawford's Early, July 5 to 15; Pallas, July 10 (for the Gulf States); ELBERTA, July 10 to 20; Early York, July 15; CROSBY'S Frost Proof, July 10 to 15; Globe, July 15 to 31; Crawford's Late, July 20 to 30; Stump the World, July 20 to August 10; Josephine, August 10; Wonderful, August 20 to 30; Lord Palmerston, September; Salway, September.

CLINGSTONE VARIETIES.

Old Mixon, July 20; Lemon Cling, July 25; Indian Blood, August 1 to 15; Old Newington, August 15; White English, August 30; Heath Cling, September 1 to 15; Florence, September 15; October Beauty, October 5; Tinley's October, October 15; Albright's October, October 20; Meadow's Winter, November 1, and will keep to December 1, if handled carefully and kept in a cool place.

The above lists are only approximate; each Southern State has its favorite local varieties, that are doubtless excellent, our design is to quote those which have been thoroughly proved and found productive and adapted to the South.

Among the mid-season peaches now attracting the most attention at the South, is the *Elberta*, a large, freestone

peach, 9 inches in circumference, very juicy, melting, and of good quality; color, yellow, with a brightly colored red cheek. It was esteemed the best out of 14,000 seedlings. It is a heavy and regular bearer, exceedingly attractive in market by its size, beauty of color and excellent quality. It is esteemed as a great money making peach, by growers who have tried it. It is a native Southern variety having originated in Georgia, and is now being planted in that State by the hundreds of thousands.

Peaches begin to bear early in the South, and are as long lived as in any part of the United States. At three years from setting out, trees often produce a good crop, and when in full bearing the best varieties yield at the rate of from 300 to 400 bushels to the acre. Choice peaches will bring from \$1 to \$2 per bushel net, 10 acres of peach orchard often yielding from \$4,000 to \$5,000 from a single crop. A good profit can also be made by evaporating the fruit, which should be first peeled and stoned to secure best prices, although good results are obtained without peeling. A good evaporator being necessary to secure best results.

Mr. A. W. Poole, of Ozark, Ark., has trees in his orchard that bore fruit in 1892 and 1893 which sold at prices equal to \$1,600 per acre.

The peach crop of the Delaware and Chesapeake Peninsula in 1893 was 6,000,000 baskets, which were sold at an average price of 35 cents per basket, or \$2,100,000 for the crop.

The peach crop of the South, that raised in the Carolinas, Georgia, Alabama, Mississippi, Arkansas, Texas and Louisiana, can never overstock the markets, coming forward

as it does from a month to two months before other more Northern grown fruit is ripe.

INSECT ENEMIES.

The only insect enemies to the peach, are the peach tree borer and the curculio.

The first is to be fought by cutting them out of the bark, just above the roots, at the surface of the ground; this should be done twice a year, in May and September; an expert man can "worm" 3 acres a day.

The curculio is not very destructive where pigs are allowed to run in the orchard, or all fallen fruit is removed and fed to the hogs. Spraying, however, with Bordeaux mixture, made with rather more lime than is used for apples or grapes, and in which a small portion (say 2 ounces to 50 gallons) of Paris green has been mixed, is said to kill them.

DISEASES OF THE PEACH.

That much dreaded disease the "yellows," has never shown itself to any extent at the South, and trees that are well wormed every year for borers are usually healthy. These same borers, however, will kill peach trees in a few years, say six or eight, if they are not destroyed. It is recommended to bank up the earth about the trees in the spring, letting it stay until the middle of September, when it should be raked away and the trunk left bare until the following spring.

PEACH ROT.

The early peaches, and in fact some of the later ones, are troubled by the decaying of the fruit on the trees, before or just at the time of its ripening. This disease seems to be kindred to what is known as bitter rot in apples and pears,

and in fact may come from some cause similar if not identical with that described on page 222, which microscopists tell us spreads from the fungous growth upon the red cedars.

Dr. Warder, in his "American Pomology," quotes from an address delivered by Dr. Kirtland before the Ohio Pomological Society, in which the idea of a fungoid cause for this trouble is strongly maintained, and spraying with copperas (*sulphate of iron*) highly recommended. At the date of the publication of Dr. Warder's valuable book, nearly thirty years ago, spraying was in its infancy, and the use of Bordeaux mixture (copper, salts and lime) had not been tried, as it has in later years.

The peach, however, is a very sensitive tree. Arsenical poisons, such as Paris green or London purple, must be used with great care, and it is an open question whether the ordinary fungicides, such as Bordeaux mixture, etc., can be used safely on peach trees. We recommend the farmer to make experiments for himself if any varieties he grows are troubled with this disease, using upon some of his peach trees very weak copper and lime solutions, Bordeaux mixture, and on others sulphate of iron (copperas) and lime solutions, prepared in the same way as Bordeaux mixture is made, or copperas alone. For fungous growths on all other trees, vines and plants, the Bordeaux mixture is the best known remedy; in fact it is indispensable to the raising of perfect apples, grapes, etc., in some localities, both North and South; but it may be found upon trial that an iron solution (copperas) is preferable for use on peach trees.

As there are plenty of varieties not subject to the rot, Southern fruit growers will find no difficulty in setting peach orchards that will pay large returns.

PACKING AND SHIPPING.

As almost everybody is aware, peaches in the South and West are usually packed for market in one-third bushel boxes, and the ordinary shipper seems to think that if his fruit is sound, not too ripe, and the finest ones put on the top of the box, he has struck the very best methods in this particular; but investigation will show that he has not. The fact is, the preparation of the fruit for shipment should begin while it is growing upon the trees. In other words, trees should not be left to bear all the fruit that sets, or many of them will be small. Thin out the fruit, removing them by hand or with a hook, so that each twig 4 inches long has one peach, 8 inches two, and 12 inches three. By this practice your fruit will be much finer and larger than if all had been left to grow.

When the fruit is nearly ripe it should be gathered *by hand* and carefully *assorted* in three grades, and packed and marked according to quality on the boxes; the best No. 1, second quality No. 2, and third No. 3, or culls. Upon the No. 1's and No. 2's you should stencil your name and post office address, putting no address upon the third grade.

Quoting from one of our large Southern growers of peaches, he says:

"A friend of mine shipped forty boxes of those Columbian and South American peaches; he is a perfectly honest old man, and his peaches were good. But he filled up those boxes with small peaches put in between the large ones. His boxes weighed 3 pounds more than mine. I shipped to the same house, and received \$1.35 per box; he received 45 cents."

The advantage of grading the fruit thoroughly is very apparent. But when it is so graded, it should be so billed

to the commission merchant to whom it is consigned, after this manner, say:

"20 boxes peaches grade No. 1.

"20 " " " No. 2.

"10 " " " No. 3."

This will call his attention to the difference in the qualities, and he will sell them accordingly.

It will be found that it always pays to grade fruit, even small fruits, such as berries, letting each grade be sold upon its merits, rather than "topping" the boxes with a better grade than that below. In this case it is certain that honesty is the best policy. It pays best, and for this reason, if for no other, we advise the shipper to grade his fruit.

PLUMS.

The plum is native to the South and will do well on any soil that will produce corn; and now that spraying is so largely introduced, the curculio is no longer feared. For this pest and for other insect predators upon apples, peaches, or plums, a few young pigs are also a good medicine, as they eat up the falling fruit and destroy the next crop of insects. But if you have potatoes or artichokes in the young orchard, you will have to keep the pigs out, and use the insecticides by spraying.

Plum growing at the South has been very profitable; the average net price to the grower for the past ten years having been \$2 per bushel. The trees are usually set 12 feet apart each way, and at six years old will often average a bushel to the tree, or 300 bushels to the acre, which will net the grower \$600; or \$6,000 from a 10-acre orchard. Plums bear transportation well and are sent to market in one-

third bushel boxes. By planting three or four different varieties, the bearing season can be extended over three months, so that the work of picking and shipping need not come all at once.

The favorite varieties are Wild Goose, Damson, Green Gage, Lincoln, Wolf, and the Japanese varieties, Abundance, Burbank, Kelsey, etc. There is good money in plums in the South and those who have tried find it so.

A cool, moist northern slope, well drained, with a rich clay or loam soil and clay subsoil, is the best site for a plum orchard, and the best fertilizers to be applied are salt, wood ashes, marls and swamp muck; but even with none of these, plums on tolerably good ground, produce excellent crops at the South.

The ground should be worked the same as is recommended for apples or peaches; and root crops can profitably be grown between the rows while the trees are young.

ENEMIES OF THE PLUM.

The curculio is the only enemy of the plum to be much feared at the South (and with spraying, using a weak solution of Paris green or London purple, the latter being the cheaper form of arsenic, 1 pound being sufficient for 200 gallons of water), this pest is effectually fought or killed off. As the curculio breeds from early spring until the first of June, several sprayings will be necessary, say every ten days from the time the blooms fall until three or four sprayings have been given. The Japanese varieties are almost, if not entirely free from the attacks of curculio, and the Abundance or Botan of the Oriental sorts is eminently successful; it bears enormous crops, commences to bear very young, is beautiful

in appearance, very sweet and juicy, of excellent flavor, and being firm, and coloring finely before it is thoroughly ripe, it bears transportation admirably. The Southern farmer and fruit raiser cannot do better than to plant freely of this beautiful fruit.

The climate of the South is well suited to the growing of either the German or Italian prune, and the midsummer weather enjoyed here is admirably suited to the curing of them. A great field is here open to the enterprise of fruit raisers.

The black knot which has been so troublesome to Northern plum growers, has not been very destructive at the South, neither has the fungoid trouble, known as the rot, been very prevalent. If, however, either of these enemies should appear, they are now readily fought off by spraying the affected trees with Bordeaux mixture.

A remedy for the curculio is proposed in the *Ohio Valley Farmer*, by Mr. Walker, of Kentucky. As soon as the fruit is attacked, take a tin pan into which soapsuds have been placed to the depth of an inch or so; place it in the tree and place a small glass globe lamp in the middle of the pan which permit to burn all night. In darting toward the light, the curculios strike the glass and are precipitated in the liquid, from which they are unable to extricate themselves.

We have never tried this method, and so do not know how it will succeed, but other insects are destroyed in this way, and it may be effectual with the curculio.

PEARS.

The pear is one of the finest fruits the Lord ever made, and the South is the place to grow them to perfection and of the finest flavor.

In the South are found many old trees bearing annual crops of large, luscious pears, many of them doubtless native seedlings. The Le Conte, which originated in Georgia, has made good money for many planters in that and some other Southern States, on red clay lands, which have all the chemical properties required by the pear. The Le Conte and Keifer pears, although they are not perhaps entirely blight proof are almost so, and if they were only finer in quality would be nearly all that could be desired.

Mr. William Jennings, of Georgia, gives his method of the management of these trees as follows:

"Begin with one-year-old trees, which are really the best for orchard planting. Three feet of the top should be cut off before planting, or, in other words, the tree should be cut back to 2 feet.

"During the summer some of the low buds should be rubbed off, throwing the growth into the upper bud. This top bud should make a growth of from 5 to 8 feet, and during the following winter should be cut back to 4 feet from the ground.

"Subsequent pruning consists in annually cutting back the leader, and the longer branches, and removing the inside branches. A Le Conte pear should at 5 years be of symmetrical cone shape. If the leader and longest limbs are annually cut back, leaving the leader somewhat the longest,

and the useless buds and limbs removed, the tree naturally assumes the shape described.

"At 5 to 6 years old the tree commences to form fruit buds and will require but little pruning thereafter. An average 12 year old tree is 30 inches in circumference above the collar, 20 feet high and 20 feet wide. * * * We find them profitable and so treat them generously."

Our own experience would not sanction the use of stimulating manures for pear trees. It causes them to throw out too large a growth of long immature wood, deranging the shapeliness of the tree and predisposing it to blight.

Ashes and lime are exceedingly valuable fertilizers for the pear, and salt in moderate amount sown broadcast in the spring around the tree as far as the roots extend, which reach out beyond the longest branches. A good location for a pear orchard is a northern slope on loamy soil, with clay subsoil, and if these have gravel intermingled or rest upon a porous shaly base so much the better. If the land has not good natural drainage and you cannot furnish it by good under or surface drainage, you had better not set pear trees there, for they will be unhealthy, dwarfed and die soon.

Pears on suitable soils and best locations are very long lived. Cole's American Fruit Book gives instances of pear trees now in vigorous life and bearing, that are from fifty to several hundred years old. One in England is mentioned, the branches of which have bent down and taken root until it now covers half an acre of land. Another tree near Vincennes, Ill., bore 184 bushels of fruit in 1834. It is still living.

Pear trees can be propagated from the seed and budded in the root, or from suckers where they spring up from the roots of the parent trees, or by cuttings. If by the latter

mode, the cuttings should be started in a shallow box filled with sand which should be kept moist, and at an even, warm temperature. Set the cuttings sloping in the sand, packing it tightly around them.

We do not recommend the use of dwarf trees, which are obtained by grafting the pear on quince stocks. At the South standards are the best, and longer lived.

Pears sell well, bringing from \$1.50 to \$2 per bushel, and at this rate should net the grower from \$800 to \$1,200 per acre.

The principal drawback on successful pear culture, North or South, is the fire blight or *pear blight*, a disease of which the origin is so far, unknown.

It usually attacks the trees in midsummer, when the growth is most vigorous, and the tree is seemingly in the very best of health. Just then some of the leaves turn black in one or two spots near the ends of the branches, and from that beginning the disease spreads downward until, if severe, and amputation is not resorted to, the tree dies. If there is fruit on that part of the tree affected, it shrivels and turns black, or brown.

No spraying with any chemical has yet been found, that would either prevent or cure this disease. The only plan suggested by the most eminent horticulturists is the prompt use of the pruning knife and saw; but even these are very often ineffectual to save the tree.

Other modes of treatment have been suggested from time to time, but we believe none have been found specifics. One of these is to bore auger holes into the stems of the trees and fill them with sulphur, others advise to drive iron spikes into the trees, others still advise a plentiful use of

scraps of iron and iron filings or furnace slag around the trees. Others suggest that trees attacked by blight have been too much stimulated by manures and plowing or working of the ground, and recommend that no animal manures be used, that the ground about pear trees should not be cultivated, but that grass be allowed to grow there. We are inclined to think there may be wisdom in these latter suggestions, and that it is not desirable to stimulate the trees to a rapid growth. We advise to keep animal or stimulating manures away from them, and to plant only those kinds found free from or least subject to blight.

We should also advise an occasional spraying, especially in the early part of the season, and up to midsummer, with the following: To a very weak kerosene emulsion add 1 pound of sulphate of iron (copperas) and 1 pound of sulphate of copper (blue stone) each dissolved in 1 gallon of boiling water; add thereto the kerosene emulsion, prepared by mixing 1 pound of bar soap cut into thin shreds, or 1 quart of soft soap, dissolved in 1 gallon of hot water, then add 2 gallons of kerosene oil and stir rapidly until a frothy mixture is formed. Take 4 pounds of fresh quicklime, slake this with 6 gallons of water, and when cool and in a creamy state, strain it through a piece of coarse sacking into a barrel holding, say 50 gallons; fill the barrel half full of water, add the kerosene emulsion and the dissolved blue stone and copperas. Fill up the barrel with water and apply this by spraying (a good knapsack sprayer will be found the most convenient to use). This should be applied all over the trunk and longer branches, and if any falls upon the leaves it will not injure them.

The scale insect sometimes fastens itself upon the twigs and bark of the pear, feeding upon the sap of the tree, greatly weakening it. The use of the mixture above described will destroy many of these pests. It is a good plan as the trees get older and the bark rough, to scrape it with a deck scraper or a piece of hoop iron.

VARIETIES OF PEARS FOR SOUTHERN PLANTING.

WILDER, best early market, very productive, June, July.

BARTLETT, large, good, productive, July.

CLAPP'S FAVORITE, delicious, June, July.

Le Conte, July.

Tyson, melting, fine flavor, July and August.

FLEMISH BEAUTY, large, vigorous tree, August.

Beurre Clairgean, large, regular bearer, September.

Duchess d'Angouleme, September.

Kieffer, September to October.

Vermont Beauty, October.

Many other varieties may be found as good or better in some parts of the South than the above, but these are given as suited to general planting here.

RIPENING PEARS.

As soon as pears are fully grown, begin to drop from the trees, and some are sufficiently mellow to be eaten, those on the trees should be gathered *carefully by hand*. The pear should no more be knocked from the trees, and bruised by falling upon the ground than Concord grapes should be treated in this manner. If you wish to render your pears unfit for market, knock them off; but not otherwise. After careful picking, they should be spread on newspapers in a

store room, and covered with woolen blankets. In a few days pick out the ripest and sell or use them, and so on till all are ripe. Some recommend to wrap each pear in soft paper, and pack them away in boxes in a dry, warm place; but as you cannot then see how each pear is ripening without unwrapping them all, we prefer the former method.

CHERRIES.

Some sorts of cherries do well here, especially the Morello, Early Richmond and the Louisiana Ironclad, originating at Homer, La. This last named is especially well adapted to Southern culture—is vigorous, hardy, enormously productive; fruit large, dark red, growing in clusters, often twenty on a twig 6 inches in length; flesh acid, but juicy and pleasant. Cherry trees should be headed low, and shortened in at the south, so as to protect the trunk from the sun. They will do well on most of the upland soils of the South, but prefer a deep, mellow, well drained loam. Tops of hills or moderately fertile plateaus, are well suited to this fruit. They do not need excessive stimulating by rich soils or the use of manures, as this will cause them to grow too fast, when the bark is liable to be split by the rapid expansion of the trunk.

A wash made as follows applied to the trunk and larger branches of the trees will be found beneficial, preventing the attacks of scaly and other insects, such as borers, etc., and keeping the bark smooth and in healthy condition.

Resin.....	3 pounds.
Caustic Soda.....	1 pound.
Fish Oil.....	½ pint.
Water to make.....	10 gallons.

Directions: Place the resin, caustic soda and fish oil in a boiler or kettle, pour over them 2 gallons of water and

cook thoroughly over a brisk fire for at least three hours; then add boiling water, a little occasionally, and stir well until you have 9 or 10 gallons of hot solution. Never add cold water while it is cooking or the resin will be precipitated, and it will be difficult afterwards to get it in solution. Apply while the mixture is still warm, but not boiling, with a sprayer, brush, or swab, to the trunk and large branches. This will also be found an excellent wash for apple, plum, pear, or quince trees, as a preventive of the ravages of borers, etc., but should not be put upon the foliage, as it will kill it. It should be applied while warm.

Cherry trees can be set, and will do well every $16\frac{1}{2}$ feet each way, or eighty-three to the acre.

It has been heretofore accepted as a settled fact that the finer sorts of cherries, such as the Black Hearts, Biggarreaus, May Dukes, etc., will not do well at the South, but it is an open question yet as to what spraying will be able to accomplish for these fruits. The application of copper salts in the form of Bordeaux mixtures, etc., may be found specific for fungous diseases, and the arsenical solutions for curculio and other insect predators, and it may be found after all that plenty of fine cherries can be raised here. It certainly seems rather strange that in countries with climates similar to that of the middle South, such as France, Germany and Italy, fine cherries are grown abundantly, while here they cannot be. The great trouble seems to be that they will not set fruit, although they blossom fully; perhaps this trouble may in some way be overcome. We do not say they can be raised, but would recommend that our farmers, fruit growers and experiment stations try each a few trees, give them three or four sprayings each year, and watch and report results.

QUINCES.

Quinces do as well here as anywhere; they are usually shy bearers, and the trees have to have age to show best results, somewhat as orange trees do in the orange growing States. The quince is not particularly partial to one kind of soil or location, but will do well either in cool, moist situations, near the borders of streams, or on gravelly hills with good culture and manuring.

The trees (for it is best to train them as low trees, rather than as bushes) can be set 8 or 10 feet apart, and they should be shortened in and superfluous twigs trimmed off to stimulate fruit bearing. Moderate applications of salt, sprinkled on the ground at some distance around the tree, have been recommended, but we doubt their being of much use.

The main points in our opinion are to keep off the leaf blight by spraying with copper salt solutions, and to prevent the attack of borers that sap the vitality of the trees, by swabbing the trunks every year, from the time they are set out up, with a resin and caustic soda and fish oil wash, as directed in the foregoing article on cherries.

These two pests, the blight and the borers, are the main causes of failure in raising quinces, and both can easily be overcome by faithful and timely applications of the remedies mentioned.

The leaf blight, originating, as it undoubtedly does, from the red cedar fungus, as we have explained elsewhere, not only attacks and kills the leaves, but grows upon and poisons the fruit, causing it to grow misshapen, to rot on one side, and finally to drop off immature and ruined. It

seems to be kindred to the apple scab and bitter rot. Thorough spraying with Bordeaux mixtures will be found very efficacious in the treatment of this disease.

GRAPES.

L. H. Bailey, of Cornell University, in his "Annals of Horticulture for 1893," states that the money invested in the New York, Chautauqua and Lake Erie grape district is \$1,000,000; that the business gives employment to 15,000 persons the year round, and that the grapes net the raisers 2 cents to $2\frac{1}{2}$ cents per pound, or from \$40 to \$50 per ton. He adds that "it is these facts and figures that have induced so many people to go into raising grapes. * * * There has been a demand for grape land, and at the present time the price ranges from \$100 to \$200 per acre without a vine on the soil." (!) What a commentary this is upon the prices of Southern grape lands, which can now be bought at from \$3.50 to \$5 per acre.

Good, well-rooted grape vines of the leading varieties can be bought at from 3 to 5 cents each in lots of 100, or even at less prices by the thousand.

The growing of early grapes for the Northern markets, offers an inviting field to the Southern horticulturist. The leading early varieties are—

EARLY OHIO, black, fair quality, early and productive, June.

CHAMPION, black, poor quality but very early and prolific, June.

HARTFORD PROLIFIC, black, quality not very good, July 1.

IVES' SEEDLING, black, quality fair, a leading market sort, July 10 to 30.

WORDEN, black, similar to the Concord, but larger, better, and few days earlier, July 15 to August 15.

MOORE'S EARLY, black, highly recommended by some growers, but we have not found the vines vigorous or productive. Do not recommend it for Southern planting. July 1 to August 1.

CONCORD, black, sweet, the leading market grape (but we prefer the Worden). July 25 to August 25.

DELAWARE, red, berries small, sweet, flavor excellent. July 15 to August 1.

WYOMING RED, handsome, bright color, berries small, not as good as Delaware, but not so subject to rot, bears well, good market grape. July 15 to August 1.

NIAGARA, white, sweet, handsome, prolific, ships well, July 20 to August 20.

POCKLINGTON, white, not as handsome or good as Niagara. July 20 to August 20.

MODES OF CULTURE.

The cheapest and perhaps the best mode of culture for grapes at the South is to train them up on stakes driven perpendicularly into the ground. These should be of well seasoned post or white oak, 3 by 4 inches, and 7 feet long. When the ground is moist from rains these, if sharpened, can be easily driven with a maul or sledge hammer, 6 inches north of each vine, the vines being set 7 feet apart each way. These stakes should be set the second year, the first the vines being allowed to grow at will without any pruning or training, the object being to let the plant acquire strength

of root and vigor of growth. Then the vine should the next winter be trimmed back to two main canes, and these shortened to one-half their length, all other branches being cut away. Tie these up to the stake with narrow strips of strong cotton cloth and the coming summer let these canes grow at their own sweet will, pulling off, however, all other shoots that may start from the main stem. The next winter, when the weather is fine and there is no frost on the vines, cut back one of the canes to the two lowest buds, from which will grow two other canes for the next season. The one cane not cut back, is the one upon which fruit may be looked for.

The old German plan is to bend this on a damp day in the winter into the form of a hoop, say of 2 feet in diameter, which is tied firmly to the stake. This method is said to partially arrest the flow of the sap and send it into the growing bunches. The next winter this hoop is all cut away, the hoop for the next year being then formed from one of the two canes which grew from the two lowest buds left the year before; the fellow cane being again cut back to two buds.

By this arrangement new bearing wood is secured each year. *The bearing wood on any grape vine is always the shoots that grow this year, from the wood that grew last year.* Study this statement thoroughly and you will have the key to grape pruning and culture.

Another method, is that called spur pruning, which consists in training the vine straight up the stake, and in the winter cutting back each lateral branch to one bud, from which branch grows the bearing wood the next spring. Vines are also trained on wire trellises, the wires being stretched horizontally, one above the other, three or four

wires 18 inches apart being used. Still another plan is the stretching of the wires overhead about 6 feet from the ground telegraph fashion, thus giving room to plow both ways beneath the trellis.

If vines are to be trained on a trellis, they should be set further apart than in the stake arrangement, some growers setting them as far apart as 14 feet in the rows, the rows being 7 feet apart.

The posts for a trellis should be 4 x 6 inches of good, well seasoned oak, cedar or mulberry. (If cedar can be secured for stakes it is better for this purpose in case the stake plan is followed, as nearly all other woods decay soon, necessitating the driving of them in deeper into the ground as they rot off). The stake plan has the recommendation of being much the cheapest, saving the cost of large posts, which if not of cedar or mulberry, rot off nearly as quickly as the stakes do, and of the wires.

A summer pruning is recommended by such experienced viniculturists as Geo. Husmann and A. S. Fuller. This, if done at all, should be done with great discretion upon poor uplands, as the taking away of too much foliage, followed by hot, dry weather, and, where vines have not been sprayed, by the denuding work of the leaf-folding worms, will have a tendency to weaken the vines. On richer ground and where vines are strong, healthy growers, and blight and insects are well fought off by spraying, a judicious pruning is advisable.

This summer pruning is done by nipping off with the thumb and finger the ends of the bearing sprouts, just beyond the third leaf above the last bunch of grapes, as soon as the racemes, or bunches of blossoms, show well upon the vines, thus throwing the sap into the grapes.

LOCATION AND SOIL.

A cold, wet, undrained piece of ground, a low flat, a damp valley along a creek should never be taken as the site for a vineyard. Choose a hillside or gentle upland slope; the lay of the land, to the north, south, east or west, is not so important as that it have a good, friable, deep loamy soil, and good natural drainage. It is best that the slope be not so great that it cannot be plowed easily in any direction.

Let all stumps be removed and the ground thoroughly broken with a large plow and a strong team of horses or oxen. There is no danger of breaking it too deeply. This work should be done before the vines are set, no after cultivation will give as good results if the thorough breaking of the soil has been neglected.

The best fertilizers for the grape are said to be bone meal, ashes, common salt, nitrate of potash, leaf mold or swamp muck composted with cow manure and leaf mold until the mass is perfectly homogeneous, fine and well decomposed. Liberal applications of this character well worked in between the rows will be found to add to the vigor and productiveness of the vines.

DISEASES.

All the efforts of the vineyardist to obtain good full crops of perfect and marketable grapes will fail if that dread disease, the *peronospora viticola*, or grape mildew, attacks his vines. Fortunately, however, he now knows what the remedy is and can apply it readily and cheaply.

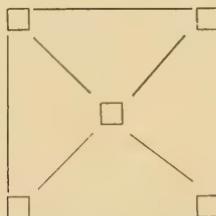
In this case the vines must be sprayed with Bordeaux mixture at least three times in the spring, once just as the first young sprouts start on the vine, again as soon as the

grapes are as large as small peas, and the third time from ten days to two weeks later.

The average yield of an acre of good vines in full bearing taking one year with another, is found to be about 6,000 pounds or 3 tons. This is what you should work, cultivate, fertilize, train, trim and fight off enemies for, so that you may gain such a yield. More than twice that amount have frequently been raised in the best vineyards of America east of the Rocky Mountains.

THE SCUPPERNONG GRAPE.

The Scuppernong is a native grape of the Southern States, a distinct variety that needs no pruning, bears prodigious crops of large, delicious, sugary grapes, of a russet, golden-yellow color when ripe. They should be transplanted not later than February and set from 30 to 50 feet apart, and will in a few years cover almost any extended trellis that may be given them. It is best to prepare a permanent



arbor, which should be of cedar or some other indestructible wood, with posts 4 to 6 inches square, $8\frac{1}{2}$ feet long, set 18 to 24 inches in the ground. These may be set 12 or 15 feet apart in square form with one in the center, on the south side of which the vine should be set, and a flat trellis constructed from one to the other as shown in the diagram. This trellis can be extended as the vine grows larger. It need not be

built until the third year after the vine is set, as this vine is a slow grower at first.

The Scuppernong does not take kindly to *fresh* manures, and all fertilizing should be done upon the surface and worked in with a fork or plow. When in full bearing immense quantities of fruit are produced upon each vine, which can best be harvested by shaking the branches over a cloth, made hopper fashion, over a large, flat basket or wagon bed. This vine cannot be propagated from cuttings but by layering, which should be done any clear, warm day in February. If delayed later than this it is almost impossible to get them to take root.

BERRIES.

STRAWBERRIES.

The first thing to be sure of in strawberry raising (as is also measurably true of other fruits) is that your location is right as to a good, near-by market, or has good shipping facilities, so your crop can reach the consumer in prime order and with little delay.

The following directions for the cultivation of strawberries are given by Dr. H. McKay, a noted Southern small fruit raiser:

"Having selected fair medium land, with good yellow or red clay basis, latter preferred, sloping, if possible, to the south or southeast, plow and work thoroughly and then lay off in ridges or beds as if for cotton or corn, but letting the middle of the bed rest on two deep subsoil furrows, and elevated 3 to 5 inches above the general level; rows being 3 to $3\frac{1}{2}$ feet wide and run so as to secure good drainage. Set the plants in the center of these beds from 12 to 15 inches apart, and about an inch deeper than they formerly set,

pressing the earth tightly about the roots. For early planting, October and November, or late February and March. Some berries will be produced the following spring, generally 100 to 300 quarts per acre, which, however, are not well suited for market, being more sappy and trashy from growing closer to the ground. If it is desired to pick these berries, give them only surface work with a sharp hoe, and commence the regular working after the crop is gathered. If this crop is disregarded, and work commenced earlier, the stools will be stronger and go through the warm weather better. In any case the working should continue upon thin land until middle of July, or on rich land until 1st of August.

"It is best to give two or three workings with the plow, following each time with the hoe, running the subsoil plow in the bottom of the turn plow furrow, so that the land is thoroughly broken and pulverized at least 8 or 10 inches deep. The grass is then allowed to grow for winter protection and to keep the berries clean. No further work except very light surface hoeing until the crop is gathered the following spring.

"It is my deliberate conviction that cheaper and better berries can be made in this latitude on medium or thin land than on rich or highly fertilized."

For early varieties at the South the best are Michel, Hoffman, Haverland and Crescent, the latter fertilized with Michel set every third or fourth row.

The Arkansas Traveler, lately introduced by T. G. Michel of Judsonia, Ark. (the originator of Michel's Early), is a superb berry to come in a week later than the Michel. His advertisement of this grand, new berry will be found in the back part of this volume. In some parts of the South

the Michel is planted solidly as the most satisfactory very early berry; its extreme earliness being its recommendation. It is not quite as productive as Hoffman, Haverland or Crescent. For midseason berries the Bubach, Warfield, Charles Downing and Cumberland Triumph are recommended, and for late, the Gandy is peerless.

We wish to add a few words to emphasize the directions given above for the culture of this fruit.

Unless the strawberry raiser is ready and willing to work his berries every two weeks during June, July and August, no matter how wet or dry the season may be, he had better keep out of the strawberry business. If he is going to cultivate corn, cotton, sorghum, sweet potatoes, etc., and neglect his strawberry beds, he had better have none; the plants will die out in the latter part of the summer, grass and weeds will smother them, and the crop he will get off the few plants that survive will not pay the cost of plants and setting. Treat your strawberries well and they will pay you well; neglect them and they will amount to nothing.

The following directions from a correspondent in a leading Northern agricultural journal are of value as showing the amount of fertilization found profitable there: "Next to thorough cultivation of strawberries is proper fertilization. It is a mistake to grow strawberries on the same ground for several years in succession. The best way is to prepare the land and to have strawberries follow a crop of corn or potatoes. Many growers use about 100 pounds per acre of sulphate of potash before planting. The potash stimulates the growth of the plants, and adds to the quality of the berries, making them better colored and firmer. Barnyard manure may be applied with good results the year of setting out of plants,

but care should be taken that the manure is free from grubs and weed seeds. Many a promising strawberry bed has been damaged by the grubs and weeds from manure.

"A strawberry crop removes certain materials from the soil which must be replaced if we wish to keep it in good condition. According to chemical analysis the fruit and the strawberry plant both contain a large percentage of potash, and it is evident, and experience has proved such to be a fact, that potash should be a heavy ingredient in all fertilizing compounds for the strawberry crop. A good formula that has given excellent results is:

"300 to 500 lbs. muriate of potash.

"600 to 800 lbs. dissolved bone.

"200 to 500 lbs. nitrate of soda.

"Half of this is applied broadcast before crop is planted, half the remainder in the fall, and the balance early in spring.

"The strawberry growers of Oswego County, N. Y., where berries are grown on a large scale for market, use from 800 to 1,200 pounds of commercial fertilizer of good quality, containing about 10 per cent of potash, 3 per cent nitrogen and 8 per cent phosphoric acid. The best time to apply such fertilizers is in the fall as a top dressing. Some care should be taken that the caustic properties of the fertilizer do not injure the plant. It is good practice also to sprinkle a few handfuls of kainit in rows at planting, as this product destroys grubs and acts as a preventive of blight.

"After the plants have borne one full crop in the second season from setting, they should be plowed under, and go to fertilize the soil. This will put the land in a better condition for the succeeding crop."

Very few if any of our Southern strawberry growers have done anything as yet in the way of artificially fertilizing the soil of their beds, and yet as we hear many complaints from our larger growers, of diminished yields and lessened profits, there is undoubtedly need for experiment and outlay in this direction.

Then there is the strawberry rust to be fought off with sprayings of fungicides. This spraying of strawberries is in its infancy as yet, but will doubtless have to be resorted to.

RASPBERRIES.

Of black cap raspberries we find the best for the South to be the Palmer. The Gregg and Tyler are both somewhat subject to blight, but Palmer seems to be less subject to rust than some others and bears large crops, ripening well together. There may be a good late variety, but we have not discovered it.

Of red raspberries the Turner leads as yet. The Cuthbert seems unsuited to the climate, and though it produces some splendid berries, the crop is light and the canes die out.

The Golden Queen is here a moderately strong grower, producing delicious golden colored fruit.

The rust, or *anthracnose*, as it is scientifically called, is exceedingly weakening and disastrous to many varieties, killing the vines and lessening the crop of fruit on any that survive. The South is not more subject to this fungus than other parts of the country.

We quote from a recently published article in a Northern horticultural journal, as follows:

"The fungus first begins its attack when the new canes are 6 or 8 inches high. Here we have a hint as to when the

spraying should be begun. In order to be successful, we must have the young canes protected by the Bordeaux mixture before the spores are formed. The applications are repeated at intervals of from ten to fourteen days. You will note that the manner of growth is such that the leaves will not interfere, seriously at least, until the third spraying or later. When the plants are in full leaf the vermorale nozzle must be thrust in among the canes. The spores can only enter young, succulent tissues, so the spray must be applied during the season of rapid growth. The disease already present cannot be destroyed. All that can be done is to prevent the germination of the spores.

"In *anthracnose* the curling of the leaf indicates that the supply of sap has been cut off by the disease feeding on the cane below. The spread of the old scabby spots on these particular canes cannot be stopped. We recommend that the spray be kept from the leaves as much as possible, for the reason that the leaves of some varieties are very easily injured by Bordeaux mixture, and in the hands of persons unfamiliar with spraying, serious damage might be done."

It may be found that with such treatment as is recommended above, the Gregg, Tyler and perhaps even the Cuthbert may be found vigorous and maintain themselves here at the South.

A mellow loam soil is best suited to raspberries, and the ground should be deeply plowed.

Set the plants 3 feet apart in the rows, the rows 6 feet apart. Ground bone is recommended as the best fertilizer, if the soil is not naturally rich enough. We have never used anything but well rotted manure, but it may be that ground

bone is better, and that rust and blight are fostered by the use of animal manures. Plow them two or three times during the summer after the fruit is picked and give them light workings with the hoe.

Raspberries are usually marketed in pint boxes, 48 pint boxes in a crate. They do not carry as well in quart boxes as strawberries do. As there are no hulls or stems, a pint of raspberries goes as far as a quart of strawberries, and will sell for as much or more money. They are a good and profitable shipping fruit at the South, where rust is fought off and the vines are vigorous.

BLACKBERRIES.

This noble fruit is well worthy of more attention than it has yet received from our Southern fruit growers. We find Early Harvest, Taylor, Ancient Briton and Warren all good. The Early Harvest, as its name indicates, is a very early berry, and valuable on this account, though not as sweet, rich or large as the others.

Other varieties that are well spoken of are Georgia Mammoth, Crystal White, Kittatinney and Snyder. The Lawton turns black before it is ripe, but is excellent when fully matured.

Blackberries will succeed on almost any soil, but on second bottom land that will produce good corn they give best results, bearing enormous crops. They should be set in rows 6 to 7 feet apart and 3 feet in the rows. Prune back in summer by pinching off the tops of the young shoots, leaving the canes to stand 3 to $3\frac{1}{2}$ feet high. Do not prune in the spring. They should be plowed several times in the summer, and the soil kept loose and free from weeds near

or in the rows, with a hoe, but the roots should not be disturbed. In plowing throw the dirt toward the plants so that the roots may be well covered.

RED AND BLACK Currants.

These cannot be recommended for cultivation at the South. They can be grown in the shade of a house or barn or on the north side of a fence, but the crop of fruit will be small. The best of Southern fruit growers have never, by mulching, pruning, spraying, or any other treatment, been able to do more than to just have the bushes exist, and bear a few scattering bunches. The trouble seems to be, that the South has too long a growing season for this plant, the leaves being shed at midsummer, and the strength of the plant being exhausted in growing a second set of leaf buds which are often frozen off in the winter. Perhaps some one in the future may produce a Southern seedling variety that may be productive and profitable here, but for the present we cannot advise their culture. We have tried for the past fifteen years to please our better half by raising this fruit; but have never been able from six bushes of the red variety, to pick more than a tea-saucer full. The black varieties we cannot get to live.

GOOSEBERRIES.

Gooseberries can be raised at the South under favoring circumstances. Plant in good, rich soil, a loam being preferable; prepare the ground by deep, thorough plowing. Plant always in the fall, giving them a good top dressing of well rotted manure, wood ashes, lime, salt, or ground bone, applying these not all at once, but in rotation. Rotted wood earth from the wood pile, tan bark, or leaf mold from the

woods are also fine top dressings and mulchings, for gooseberries. They do best where the shade of a fence or of buildings gives them partial protection from the sun, this is especially true of the English varieties. They require regular pruning every year, cutting out old wood as much as possible, shortening the stronger new canes one-third of their length, cutting out suckers and weak shoots so as to admit light and air. To prevent mildew, which North or South, is very liable to attack the berries, spray bushes as soon as the leaves appear and several times during the summer with potassium sulphide (liver of sulphur), using 1 ounce to 4 gallons of water. This will prevent mildew, and upon gooseberries is preferable to the use of Bordeaux mixture for this purpose, it also keeps the foliage in good health and growing vigorously. Gooseberries can be more easily propagated by layering than from cuttings. The best plan is to bank up the earth in the spring, say 8 or 10 inches around the plant from which you desire new plants, and the young canes will strike root at their bases under the embankment, and being cut away from the parent plant in the fall, are ready for transplanting. The leading varieties are:

HOUGHTON, small, red, an old tested variety, very productive, a good market variety.

WHITESMITH, also an old variety; large, pale green, yellowish when fully ripe, good quality; bush moderately vigorous, very productive.

CROWN BOB, old English variety, large, red, hairy, good quality.

INDUSTRY, red, best English berry, vigorous, bears very heavily, berries very large and excellent in quality.

LANCASHIRE LAD, red, smooth skin, one of the largest and best English sorts. Bush a strong grower and productive.

KEEPSAKE, New England variety, straw color, large, excellent, very early, a sure cropper, and good market sort.

CHAUTAUQUA, American seedling, strong, upright grower, very productive, color light yellow, large, excellent flavor.

DOWNING, American, pale green, good quality, vigorous, usually free from mildew.

GOLDEN PROLIFIC, American, fruit large, golden yellow, good quality, heavy bearer, free from mildew.

RED JACKET, new American, red, large, good quality, very productive, a hardy strong grower, does not mildew, excellent market variety.

TRIUMPH American, light green, large, very productive, free from mildew, an annual bearer.

MULBERRIES.

This tree should by all means be set out plentifully by the Southern farmer, as it affords such a large amount of excellent food for hogs and poultry. It is easily propagated, a rapid grower, and the timber exceedingly valuable for fence posts, as it is very lasting, does not need to be seasoned, but can be used at once as soon as cut.

Mulberry trees may be set along the fences and roadways, or in the chicken yard, and will drop their fruit for several months. It is claimed that a mulberry tree of one of the best varieties is worth each year as much as a barrel of corn in feeding chickens or fattening hogs.

The fruit of the wild mulberry is not of much account, but that of Downing's Everbearing and of the Hicks and Stubbs varieties is fine, large, sweet and beautiful. This fruit makes good pies or wine.

The Russian mulberry is a rapid grower, attains an immense size, is very easy to propagate, and the timber is very valuable for cabinet work or fence posts, being as lasting as red cedar. Its fruit is good for poultry or pigs, but not as fine or large as the other sorts named.

FIGS.

Figs succeed best on well drained, very rich land. In the green state they are not a shipping fruit, but are very sweet and refreshing. They also make a fine rich preserve, a sort of marmalade. Figs dipped in a soda solution, then when dry, washed and dipped in syrup, dried and boxed in the same manner commercial figs are prepared, are a good shipping product, and the more southern parts of the Southern States are eminently adapted to their culture.

They can be easily propagated from rootlets and suckers from established bushes, and need very little culture. It is well, however, to cut out weak canes each year, throwing the sap into the stronger bearing branches.

The leading varieties are:

BRUNSWICK, large, color violet, good, productive.

BLACK ISCHIA, medium, black, sweet, prolific, hardy.

BROWN TURKEY, medium, brown, sweet, delicious, hardy, regular bearer.

CELESTIAL, small, pale violet, sweet, prolific, hardy.

GREEN ISCHIA, green, with crimson pulp, good, prolific.

LARGE BLUE, large, bluish purple, oblong.

WHITE MARSEILLES, very large, white, deep red flesh, excellent.

LEMON, large, yellow, sweet and good.

WHITE ADRIATIC, large, white, excellent, the fig from which the finest dried Smyrna figs are produced, bears early and very heavily.

MANDANA, very large, purple, everbearing, apt to be killed down in winter, but sprouts up and bears again the next spring.

Figs can just as easily be raised from the seed as cabbages or radishes can be raised in a garden. Sow them in a shallow box in rich earth, shading it partially until the seeds vegetate; the next fall set them out in the ground where you wish them to stand. Figs like a very rich soil. It is impossible to get it too rich for them, but if manures are used, they should always be thoroughly composted and rotten.

Lime and ashes are fine fertilizers for figs. Some varieties of this plant are subject to the ravages of a blight or rust that kills down the ends of the young shoots. Spraying with Bordeaux mixture will undoubtedly be found beneficial.

CRANBERRIES.

We know of no reason why this fruit should not be grown at the South, or at least in the northern half of the Southern States, wherever lowlands of a marshy character are found. Land that is partially covered with water in the winter and spring is generally used for the growth of cranberries. They are easily propagated from sods cut in a cranberry marsh, and if set in a favorable location will soon extend themselves over many acres of ground. They do not grow

readily from seeds, but sods procured in the fall and set in a damp, swampy place, will make a good growth the following season. A black, mucky soil is best suited to their growth, and as their after cultivation, outside of supplying them with water in the winter and at other times if the soil should become too dry, is almost entirely without expense, the net returns are quite large; as \$100 and upwards per acre are often realized.

Cole says of it: "In some cases, it has been found growing spontaneously on high land, which has led to various experiments with this plant on common tillage, where it yields superior fruit, of extra size, and is more exempt from frost, so destructive on lowlands, where the thermometer is 6 or 7 degrees lower than on high land. * * * * We saw fine cranberries of natural growth in a field, close by which the owner was reaping a good crop of barley. We examined the soil, and it was dry and sandy, with a layer of shallow vegetable mould at the surface; yet apparently wet in spring from its level situation. Where a gravelly knoll had been reduced for a road, we saw excellent cranberries of spontaneous production, on dry, hard and poor soil.

"With these cases of good crops under great disadvantages, it would be surprising if cranberries should not grow well on high land under good culture. * * * * In raising on high land, it would be well to select rather moist tillage, and use peat and muck for manure, which is their natural soil. We think that a black, moist, sandy loam would be best. It would be well to make experiments in the use of salt and other manure. Those plants that grow naturally on high land would doubtless be better for this purpose."

It would undoubtedly pay to experiment with this fruit on our varied soils, climates and locations at the South. It would be well that their growth from the seed should be attempted, or that roots should be imported (they could be sent by mail) from those parts of the country where cranberry meadows already exist. We hope that our Experiment Stations may take this up, and give us some light upon the subject.

RHUBARB, OR PIE PLANT.

This plant is esteemed for pies and tarts, being ready for use earlier than any other kind of fruit. It has an agreeable tart flavor resembling that of gooseberries, the part that is used being the thick leaf stalks, which are cut in thin slices and used the same as the flesh of apples.

It succeeds in the more northern and mountainous parts of the Southern States, but it has been deemed impossible to prevent its dying out the third season, in the more southern parts of the country. It is propagated by cuttings from the root crowns or buds; setting them in rows 3 feet apart, and 2 feet apart in the rows, covering the top of the buds with about 1 or 2 inches of earth. It is generally recommended to plant rhubarb in very rich earth, but from our experience thus far with this plant, we are inclined to think that in the South it is more likely to rot and die if set in soil made rich with manure, even though it be thoroughly rotten. We recommend to set it in a loam soil naturally rich, but not made so by manuring, and if the ground be enriched at all, let it be with ashes, or ground bone, supplying the potash and phosphates the plant needs, or with vegetable manures. We recommend that the planting of the sets be done late in the fall, say in October or November, as this will give the plants

time before our long spring and summer warm weather comes, to get started in the growing of roots.

It might be well, if you have such a spot on the farm, to set the plants on the north side of a stone wall or on some cool northern slope in the shade of a fence or building, but not so close to it as not to give room to work all around it. Set it then 2 or 3 feet from the wall or fence, and give the ground several shallow workings through the summer months, and continue this into the fall if the weather is dry and warm.

It is not well to use the stalks the first year, as the removal of these weakens the plant; blossom stalks should be cut off, as the blossoms and seeds draw heavily upon the strength of the plants.

It is best to provide a double quantity of plants, taking the stalks (fruit) from one section of the bed one year, and from the other the next, so giving the plants each a year's rest. This is not necessary at the North, but is recommended here.

We cannot emphasize too strongly the desirability of having the ground thoroughly prepared by deep plowing and subsoiling, or trenching, before the plants are set, and letting all enriching matter of whatsoever sort is used (and it certainly should not be of a fermentable character) be placed deep in the ground, and in no case come too near the plants. Let the earth around them be of as cool unfermentable character as possible.

Plants can be raised from seed, but cuttings from the roots, with one or more buds or crowns on them, are recommended, as they come much quicker into bearing. However it is desirable that some Southern horticulturist produce a variety, by raising it from the seed of a plant growing at the

South that may be better adapted to our climate than Northern sorts. We hope this may yet be done.

APRICOT.

This is a beautiful tree, both as to bloom, foliage and fruit, but we think can never be cultivated at the South profitably on account of its very early blossoming, which dooms it nearly every year to be cut off by frosts.

The fruit resembles a peach somewhat, does not grow as large as the larger peaches, has a stone very much like that of a plum, and some varieties are juicy and of a delicious flavor.

We regard it as altogether too uncertain as to getting a crop, to recommend any Southern planter to waste money in setting it out. Japanese plums are fully as delicious and infinitely surer croppers. They are profitable, apricots are not.



PART V.

Nut Bearing Trees AND Other Special Crops.

PECANS.



PROBABLY there is nothing that will prove a better life insurance at a less cost than a pecan grove. Pecans seem to succeed on almost all kinds of soils in the South. The outlay for a 10-acre grove of pecans is not heavy; it will cost about as follows:

Ten acres of improved land.....	\$100 00
Nuts, planting and working.....	50 00
Interest and taxes, 12 years.....	190 00
Total cost.....	\$340 00

If forty trees only are set per acre, and the yield the twelfth year but half a bushel to the tree and sold at \$2.50 per bushel, which is a very low price, would bring \$50 per

acre; when twenty-five years old the trees will bear 5 bushels, to the tree, or 200 bushels per acre, worth at least \$500; or from a 10-acre grove the snug sum of \$5,000 per annum. Surely, then, we are not in error in saying that pecans furnish an excellent life insurance policy at a very small cost.

Nuts freshly fallen from the trees are preferred, as they sprout more readily than those which are older and dryer. If these cannot be obtained, soak the nuts from one to three weeks, or long enough to have them in the same condition as when fresh from the trees. Plant them 3 or 4 inches deep, either in nursery rows or where they are to remain.

If planted in the field, the plantings should be 25 to 50 feet apart, three or four nuts being put at each station, to insure a stand, all being removed the second year, but one, the strongest grower in the lot. The location of each hill or planting should be plainly and permanently marked by good, strong stakes, 4 or 5 feet tall, of oak, cedar, or some other lasting wood, driven firmly into the ground.

Another plan is to plant the nuts in a nursery row. A wide, deep furrow is opened, into which a good supply of well-rotted compost or ground bone and cotton seed meal is placed. The nuts are dropped on this, about 10 inches apart, and pressed firmly into the soil with the foot. The planting can be done any time from the falling of the nuts until the 1st of April. They should be kept clear of grass and weeds by good and regular cultivation, and this will promote their strong and healthy growth the first year, which, if the soil is good and rich, should be of from 20 to 30 inches.

The more liberal preparation and enriching of the soil you can give before planting nuts, or transplanting young trees, the better, as they grow much more rapidly and strongly

in good soil; therefore, use plenty of good compost at and about the planting places.

If you have grown your young trees in a nursery row, transplant the next fall as soon as they have shed their leaves. If you cannot do this, and the trees have to remain another year or more in the nursery, cut their tap roots (the main center root) by running a sharp spade under them about 18 inches deep. This will cause the young trees to throw out strong lateral roots. You can then let them remain where they are for another year, or even two, if necessary. Some people have supposed that pecans and other nut trees would not grow and produce well, if the tap root is cut; but the experience of our best pecan growers does not bear this out; they do fully as well, and another tap root always grows out again, in soils suitable for pecans.

It is recommended that particular care be taken in transplanting these trees, *not to set them at all deeper than they stood before their removal.* Let the tree stand 3 or 4 inches higher than the surrounding ground when finished planting, to have the proper depth. The after-cultivation should be thorough. The ground between the trees may be cultivated in a crop, such as potatoes or cotton, for the first five or six years and after that let them have their own way and take care of themselves.

A good plan is also to plant peach trees alternately in the rows, if the location is a good one for this fruit, or plums, cutting them out when the pecans have grown large.

The pecan begins to bear in some instances at five years, usually at six or seven. If the tree has had good attention, it nearly always blooms one year before bearing nuts. At ten years of age, you may expect a paying crop 45 pounds

to the tree, increasing in quantity annually until the trees arrive at a mature age, thirty-five to fifty years. When the trees arrive at this age, they should be cut away to stand 50 or 60 feet apart.

BLACK WALNUT GROVES.

The black walnut is another splendid nut to plant in the South.

Prepare the ground as if for a corn crop, then lay it off in check rows 16 feet apart and at each intersection drive in a stake of dry oak or some other lasting wood and plant near this stake three or four nuts (just off the tree) to insure a good stand, removing all but one of the plants as soon as they are well established, the second year.

If your seed-nuts are not fresh, soak them two or three weeks, and they will be pretty sure to grow.

The placing of the stakes, to mark where the nuts are planted and where the trees shall stand, is highly important, as, if this is not done, when the trees are young and small, grass and weeds will cover them up; and not being able to see them, they are liable to be plowed up in cultivating the land.

Trees at 16 feet apart give 170 to the acre, and it is estimated that the fruit after the eighth year will be worth \$40 per acre and after the fifteenth year double that amount, while the trees at their fifteenth year would furnish lumber worth over \$2,000 per acre, or if allowed to stand until fifty years old would cut into lumber worth \$8,500 per acre, and at the same time would each year have been producing nuts worth from \$80 to \$100 per acre.

Black walnut trees, like pecans, have long tap roots, and derive the most of their sustenance from the subsoils; and crops can be grown between and in the rows while the young trees are growing, to the advantage of the trees, and such crops can be made to pay all interest on the money expended in land, taxes, etc., while the trees are coming into bearing.

The same thorough culture and enriching of the soil, which is recommended for pecans, should be given to black walnuts.

ENGLISH WALNUTS.

This tree is of two varieties—the common English, a tree of lofty growth, hardy and productive, but like the American black walnut, does not come into full bearing until it is twelve to fifteen years old; and the Paper Shell, or early-bearing English walnut, which begins to bear in from four to six years. The latter is very hardy, can be grown anywhere at the South, and as it blooms late, it escapes late frosts, and is a regular and profuse bearer. This variety originated in California, being a seedling from the original English, or as it is sometimes called Spanish, walnut. The fruit is larger than that of its parent, and the shell so thin it can be easily broken by the hand.

If fresh, green nuts can be obtained in the fall, trees can be grown from these, either by planting them where it is intended to have the trees stand, or growing them in a bed and transplanting them.

In sprouting all seeds of the nut kind, it is well to have the bed in which they are planted partially shaded with a brush arbor, thus reproducing as near as possible the condition of forest life, which is natural to the plant. When the sprouts appear above the ground, the shade should be par-

tially removed, until at last all is taken away. The following fall or spring, the young trees should be transplanted to the field, or placed where they are to stand.

Walnuts, and in fact chestnuts, should be given the same culture as apple trees; that is to say, the ground should be cultivated but with shallow culture. The English walnut should be set about 20 to 25 feet apart. These nuts sell at about the same prices as pecans, and an orchard of walnuts in good bearing is one of the most valuable pieces of property any one can have.

ALMONDS.

This is another nut well adapted to the South, and there is no reason why they should not be largely grown here. There are two varieties, the Hardshell and the soft or Paper Shell.

The Hardshell sort bears a large, showy, ornamental blossom, and when the fruit is ripe the outer hull cracks open and the nut drops out. The soft shell variety is not quite so hardy as the hard shell, but would undoubtedly do well in almost any part of the South, excepting it might be upon the mountain plateaus.

Almond trees should be set the same distance apart as peaches and given the same culture.

CHESTNUTS.

The American or sweet chestnut is native to the South, being found growing wild in the woods in several of the States, and all the varieties of this nut succeed here on trial.

The American chestnut is a fine, large tree, growing symmetrically, and is very handsome as a shade tree. When fully grown, it bears large quantities of excellent sweet nuts,

which find ready sale in any large town or city. We do not think anything has yet been done in any part of the United States in the way of growing chestnuts in orchards as a business, but it would doubtless be a profitable investment on the cheap lands of the South.

SPANISH CHESTNUTS.

This is also a very handsome tree, of somewhat more rapid growth than the American, and coming into bearing early, yields heavily of large and very salable nuts. This would be a very profitable tree to plant, commercially, at the South, as a net profit of \$25 per tree is not unusual.

Trees of the chestnut varieties can be bought from almost any good nurseryman, or may be grown from the nut by using the same precautions as are recommended for walnuts, namely, to plant fresh, green nuts, and to shade the ground and keep it somewhat moist until the nuts sprout. The price of the young trees at the nurseries is from 15 to 25 cents each, according to quantity bought.

JAPAN GIANT CHESTNUTS.

This tree is of a dwarf habit, but bears very large nuts, hence its name. It comes into bearing much earlier than the American or Spanish varieties, commencing to yield fruit at from two to three years of age. It also bears very heavily, and doubtless would be a very profitable tree at the South where conditions of soil and climate are very similar to those in Japan; it may also be stated that trees of the chestnut family thrive on land too poor to raise corn or wheat; in fact, their home seems to be poor upland ridges and slopes. In order to secure best results, however, they should be set as recommended for pecans or black walnuts, each one by

the side of a stake driven in the ground, and the soil about them given shallow cultivation through the summer to insure them against drying out and to cause them to grow vigorously.

JAPAN WALNUT.

This tree is another valuable acquisition from the Japs; and when better known, will become a great favorite.

It is found growing wild in the mountain regions of North Japan, and is said to be a very hardy tree. They grow with great vigor, and assume a handsome form without pruning; the leaves are very large and the foliage is extremely beautiful, being of a vivid, clear green color.

It is immensely productive, yielding good crops of nuts, which grow in clusters of fifteen or twenty, and have a shell somewhat thicker than the English walnut, but not as thick as that of the black walnut, the meat being sweet and preferable to that of any other member of the walnut family. The trees mature early, and are regular and heavy bearers. As it has an abundance of fibrous roots, it can be transplanted as safely as an apple tree. We do not recommend the application of fresh stable manures to nut trees of any kind; they do not take kindly to any such application; in fact, none of them, unless it be the pecan or black walnut, seem to flourish in very rich soils, and these best in places where the ground is naturally rich. Set chestnuts and English and Japan walnuts on well-drained upland; in the fall, just as soon as the leaves have dropped, rather than in the spring, and then give them shallow cultivation, to insure a good growth, always setting a good, well-seasoned oak or cedar stake on the north side of each tree, so the plowman can see just where it is and avoid striking it with his whiffletree.

ENGLISH FILBERTS AND HAZEL NUTS.

The common filbert or hazel nut is native to many parts of the South, and the cultivated sorts do equally as well. They grow as a bush rather than as a tree, growing to a height of from 6 to 10 feet. They are of easy culture, are hardy, abundant bearers, and succeed at the South wherever they have been tried. They can be set quite close together, 6 feet apart each way giving them ample room.

The "Kentish Cob" is one of the finest and largest of this family; in fact, a distinct variety, being long in shape and nearly twice as large as the hazel nuts sold in the stores, and is known in England as the filbert. These nuts are rarely ever imported into this country as an article of commerce, but are much finer and more delicate in flavor than hazel nuts.

Filbert and hazel nut bushes are easily raised from the nuts, sprouting them in a bed partially shaded and under wet leaves, or can be grown from suckers taken from an established bush.

The United States affords a good market for hundreds of thousands of bushels, and they would be a very profitable crop on our Southern cheap lands, much more profitable than cotton or even corn in the long-run; as once established, they would need no further attention and involve no further expense, excepting to gather the nuts.

The growing of nuts opens up a new field for profitable investment at the South; and in fact, it is a matter of surprise that so little has been done in the United States either North or South in this business. At the South, especially, on our lands which are still so very cheap, and in a climate

so admirably suited to their growth, it is wonderful that so little has yet been done in the growing of nuts.

For the intelligent farmer who will set out an orchard of nut-bearing trees, say of ten acres, one acre in filberts, two in pecans, two in black walnuts, one in American chestnuts, one in Spanish chestnuts, one in Japan chestnuts and two in early bearing English walnuts, there is an independent fortune, or an income at ten years from setting of not less than \$1,000 per year; in twenty years, of \$2,000 per annum; and at thirty years, of at least \$4,000 per year; besides having black walnut and other valuable timber in the patch worth at least \$4,000 more.

BROOM CORN.

This crop is best raised in drills, not in hills, although some growers plant it so. In drills, about 10 quarts of sound seed will plant an acre, the drills being $3\frac{1}{2}$ feet apart. A kindly loam soil is preferred to a stiff clay or a sandy one, although any soil that will grow a good crop of field corn will grow broom corn, and it should be made rich by applications of well rotted stable, pig or sheep manure, if not naturally so. This may be worked in after it is spread broadcast, by the plow and harrow, or if the land is quite poor, can be applied in the rows. A grain drill which opens the rows, plants and covers the seed, all at one operation, can be used to advantage in the extensive growing of this crop. Land should not be run in broom corn more than two years in succession, as it draws heavily upon the strength of the land; it is better, to alternate with root crops, clover or cowpeas.

Broom corn should not be planted until the ground is warm, say the first of May in the Middle South, and when it is up, run between the rows with scooter and heel sweep, as

described on page 12, or with cultivator or pony harrow, keeping the soil mellow and well stirred, but not deeply, working also with hoe close to the rows so that weeds and grass get no advantage. Thin out the plants when 2 or 3 inches high to 6 to 8 inches in the rows, or three to six plants in the hill, according to the fertility of the soil.

Long and straight staple is the main point and this can be secured only by encouraging a strong growth by heavy manuring and good culture and by bending down the brush part, called "lopping off," at a point a foot or foot and a half below the brush.

When ripe, that is, when the blossoms shed, cut the brush off at the point where bent over, with a sharp knife and lay the heads where they will cure perfectly straight, and dry under cover in a barn, shed or curing house. This curing will be perfected in three or four weeks, and can be best done on light slat racks, so that the corn can be dried in thin layers on the different slat shelves of the rack. When fully cured the seeds, by the old-fashioned method, were removed by combing them out in a hackle made of iron or hard wood bars with pointed ends set firmly upright, not more than a quarter of an inch apart, in a wooden frame, and this method can still be used where experiments are made in the growing of small patches of broom corn, but in cultivating this plant to any considerable amount, the removal of the seed is now rapidly done by machines run by horse power or steam. The broom corn should then be packed in a square bale, heads upon heads, the butts outside, evenly and smoothly, the length of the bale being 4 or 5 feet, and the height and breadth $2\frac{1}{2}$ to 3 feet, with slats or thick laths at the corners

and sides (not at the butt ends), and all held in place by strong wire or heavy twine bands.

The present price of broom corn is only from \$35 to \$70 per ton, according to quality and length, but is sometimes worth about double these figures. That which has a green color and yet is perfectly matured and cured is esteemed very much better than that having a yellow or red appearance.

Broom corn seed hacked out from the brush, though not sufficiently mature to use for planting, form a good feeding grain when ground with corn for hogs, sheep and poultry.

Broom corn fodder is valuable for feeding purposes after the brush has been removed, and cattle should be turned in on it in the field to help themselves. The stalks make a good fertilizer and can be run through a corn cutter and cut 3 or 4 inches long and put in the barnyard where they can be tramped down by the cattle and absorb the urine and other nitrogenous products, or they can be plowed under or burned in the field and the ashes used as fertilizers. The former is, however, the best way of securing the full value of their chemical constituents and making them useful.

The following article is taken from a leading agricultural journal, and as it contains some items in regard to the culture of broom corn not given above, it will be of interest:

"Though rich alluvial soils are best adapted to the growth of broom corn, it thrives well on such soils as are considered good for Indian corn, especially a rich loamy land not liable to late or early frosts. A very common practice, yielding good results, is to plant on greensward turned up late in the fall, that the action of the frost may kill the worms and assist in making it loose and friable. Clay lands have been found unprofitable for this, as they are,

to a considerable extent, for Indian corn. Manuring and thorough culture are the great auxiliaries of broom corn. Horse and sheep manure are the best, though any other reliable fertilizer may be used to advantage, if it does not cost too much.

"There are different kinds cultivated in different localities. The smaller sort, grown along the Hudson River, is ordinarily the best crop, being some days earlier than the other varieties. It usually yields from 700 to 800 pounds of brush to the acre. The New Jersey, or large kind, usually yields 1,000 pounds to the acre, and not unfrequently more. The stalks and seeds are larger, and the brush makes a heavier, coarser broom—not as desirable in many respects as those made of the finer brush of the small corn.

"Broom corn is planted in rows about 3 feet apart, so that a horse can pass through with a cultivator. The hills in the rows are from 18 to 24 inches apart, though on many farms the custom prevails of sowing nearly in continuous rows or drills, by means of Emery's Albany Drill Barrow, which is well adapted to the work, saving much time and labor. The quantity of seed varies from 1 to 3 pecks per acre, according to the method of planting and the views of the grower. A small quantity of seed induces larger plants and more coarse brush, while the hills that have eight or ten stalks grow finer and produce a more valuable brush.

"Broom corn, like other crops of this character, requires thorough cultivation. It should be hoed three times,—the last time as late as it is safe to work among it, which is often after it is 3 feet high.

"The crop is usually harvested at the commencement of frosty weather, by breaking down the stalks 2 to $2\frac{1}{2}$ feet

from the top, and allowing them to hang a few days until the brush becomes straight and compact, when it is cut off, leaving the stalks 8 to 12 inches in length, which are then put up in convenient sized bales—making an important article of commerce, always marketable, and bringing good prices. Thousands of tons are grown in Ohio and shipped eastward to New York and New England."

St. Louis is a large Western market for broom corn, as very large quantities of brooms are made there.

Sanford Howard, Esq., speaking of the culture of broom corn in the Mohawk Valley, where a very large acreage is planted, says:

"The broom corn is not left to ripen as formerly, but is cut while it is quite green, and the seed not much past the milk. It was formerly the practice to lop down the tops of the corn, and let it hang some time, that the brush might become straightened in one direction. Now the tops are not lopped till the brush is ready to cut, which as before stated, is while the corn is green. A set of hands goes forward and lops or bends the tops to one side, and another set follows immediately and cuts off the tops at the place at which they are bent, and a third set gathers the cut tops into carts or wagons which take them to the factory. Here they are first sorted over and parceled out into small bunches, each bunch being made into brush of equal length. The seed are then taken off by an apparatus with teeth like a hatchel. The machine is worked by six horses and cleans the brush very rapidly. It is then spread out thin to dry, on racks put up in buildings designed for the purpose. In about a week, with ordinary weather, it becomes so dry that it will bear to be packed closely.

"The stalks of the corn after the tops have been cut off, are 5 or 6 feet high, and they are left on the ground and plowed in the next spring. It is found that this keeps up the fertility of the soil, so that the crop is continued for several years without apparent diminution. It should be observed however, that the ground is overflowed every winter or spring and a considerable deposit left on the surface, which is undoubtedly equivalent to a dressing of manure.

"In case of need the stalks would furnish a large amount of good food for cattle. They are full of leaves which are very nutritive, and whether cut and dried for winter, or eaten green by stock turned on the ground where they grow, would be very valuable in case of deficiency of grass."

TOBACCO.

Tobacco is a filthy weed;
It was the devil sowed the seed.

So says some "machine poet." Be this as it may, and we leave the question of its origin to others, mankind seems to love it, and as a money-making plant in the South, it has a prominent place. Our desire is to give as briefly as possible such directions as will enable almost any farmer to raise and cure tobacco, if not in the most scientific manner, in such a way as to produce a good merchantable article.

In the year 1882, I. W. G. Wierman planted 15 acres in tobacco, in Saline County, Ark., of which he says: "No finer crop ever grew on American soil." We give here a few points in the growing of fine tobacco abridged from his directions.

Sow the seed early in January, where a large brush heap has been burned, raking the ashes into the soil, then

sprinkle the seeds over the bed and press them down with a flat board. Set out the plants in April—the earlier the better, when the weather is favorable. New land is not as good for tobacco as that which has been cropped for several years, but it should be rich or fertilized with wood ashes or well rotted manure, applied broadcast or in the hill. Set plants from 2 to 3 feet apart, according to variety. Nearly level culture is best. Work well and often; after a rain is a good time to cultivate it.

Tobacco should be "topped" before it blossoms—how high or low is a matter of experience—about the eighteenth leaf from the ground is the general practice. All suckers should be pulled off before they are 3 inches long, but let all the leaves grow; the lower leaves prevent the sun from drying the ground about the roots, and protect the leaves above from dirt when it rains.

When a tinge of yellow comes on the leaves or they assume a mottled appearance, or they break when folded over between the thumb and finger, the tobacco is ripe. Then with a hatchet cut into the stalk to the heart, 10 inches above the ground, then split down the middle of the stalk to within 3 inches of the ground, turn up all the leaves and chop it off close to the ground. The stalks are then hung on laths and are ready for drying. The best time to cut tobacco is after 3 o'clock. If cut on a hot day and allowed to lie in the sun for fifteen minutes, it is burned. The drying barn must be got ready for use before the crop is ripe, and should be 24 feet wide by 48 feet long and 14 feet high, with three ventilators on top of roof, and lines of posts 4 feet apart, resting on rock bases and nailed to the roof rafters. These posts hold the cross pieces which support the laths of

drying tobacco. Care must be taken to hang the laths so the tobacco on one does not touch that on any other.

No fire is used in curing fine, thin tobacco, such as is used for cigars, but heavier, such as is used for pipe smoking and chewing, is fire-cured.

We also give a few items on the growing and cure of tobacco, taken from an article by Walter W. W. Bowie, of Maryland, published in the report of the United States Commissioner of Agriculture for the year 1867.

He says a site having a rich loam soil on the south side of a gentle elevation, is the best place for a seed bed. It should be protected from winds by woods or shrubbery.

The bed, after burning a brush pile on it, should be dug deep with a grubbing hoe, chopping and raking it until it is thoroughly and deeply mellow like a hotbed, and all clods, roots and stones removed. Then sow Peruvian guano at the rate of 400 pounds per acre and work it in. For 100 square yards mix one gill of seed with half a gallon of land plaster or dry sifted ashes, and sow evenly, roll with a hand roller or tread down with the feet. Sow any time during the winter when the land is in order. If sown before middle of March, the bed should be covered with bushes free from leaves. (In the middle and lower Southern States this will not be necessary, and an earlier sowing is recommended.)

Sow when the land is in good working order; if too wet, it will be work thrown away. It is recommended to sow at intervals, so as to be sure of getting a stand, or securing good, strong plants. Beds must be kept free from grass and weeds which must be picked out by hand.

After the plants are up they should receive a top dressing, about once in ten days, of well rotted and pulverized

horse manure, or a mixture of equal parts stable manure, ashes, plaster and vegetable mold, with soot and sulphur, say 4 pounds of the latter to 4 bushels of the mixture. This has been found efficacious in arresting the ravages of the fly, it being distasteful to the insect. If possible, the plants should stand in the seed beds about 1 inch apart, if too thick, rake the bed and kill out superfluous plants.

Mr. Bowie recommends a sandy loam soil, rolling lands, not liable to overflow by excessive rains. He also states that *new land is better than old*, and this is the verdict of the majority of tobacco raisers in the older Southern States, while Mr. Wierman, of Arkansas, recommends land that has been cropped for several years, probably the difference is in the character of the soils, one requiring a toning down and removal of some chemical attribute, while the other does not; so that in one locality new land, and in the other, old land is best. In the older Southern tobacco-growing States, also, such as North Carolina and Virginia, it is found beneficial to fertilize tobacco by using from 200 to 400 pounds of Peruvian guano per acre, applied in the hill. This is not necessary on the newer and richer lands of the Southwestern States.

The plants should never be set deeper than they stood in the bed, and the roots should never be bent up, or crooked, but straightened out, and the earth pressed tightly about them with the thumb and finger.

In three or four days the plants may be weeded out—that is, hoes are passed near the plants and the hard crust on the hills broken away; the ground should not be allowed to get at all grassy or weedy. After weeding out, a teaspoonful of plaster, or of plaster and ashes mixed, should be

put on each plant. Mr. Bowie advises frequent plowings until the plants are too large to be cultivated without danger of injuring the leaves by the whiffletree, then the work should be done by hoeing, always keeping the ground level.

Select the best plants for seed for the next crop, 100 plants will furnish enough for a crop of 40,000 pounds, all other plants should be topped before they blossom.

Worms must be destroyed frequently, as often as every other day is recommended, picking them off into tin cans with the fingers. A flock of turkeys is a great help destroying thousands of worms. One planter is stated to have destroyed the worms in the following manner, but we rather think it was the moths which lay the eggs that hatch out into tobacco worms that he destroyed. The mode as given (United States Agricultural Report 1869, page 296,) is as follows: Set among the tobacco plants in the field "a few plants of Jamestown Weed (*Datura Stramonium*) of the blossoms of which the tobacco worm is very fond. These weeds blossom just in time for the advent of the worm. He then mixed an ounce of 'fly stone,' or cobalt, with water, making the compound very sweet with honey, and put it in a bottle, in the cork of which a goose quill was inserted. Every evening just after sunset he dropped the mixture into the blossoms of the Jamestown Weed, about three drops to each. The worms were destroyed in large numbers, and this success induced repetition of the process on neighboring plantations, with similar results. As a matter of convenience, the blossoms into which the poison was dropped were pulled off on the morning after the application, to prevent the poison from destroying the weed itself."

To come back to Mr. Bowie's directions; he advises that in getting tobacco ready to cure, the sticks upon which it is to be hung, be sharpened at one end so that a spear-like steel point can be slipped on, then by placing the other end of the stick in the soft ground, taking the tobacco plant in both hands it is pressed down over the spear and strung on the stick, this being repeated until each stick is full, the plants hung on the sticks 4 or 5 inches apart, the leaves when the plants are hung in the drying barn being smoothed down so that they shall not touch and crumple each other. The sticks are hung 12 or 15 inches apart, each end resting on the cross joists. As the tobacco cures, the sticks may be pushed closer together, to make room for more tobacco, and to exclude damp air.

Our own colored "man Friday," who has worked in tobacco raising in Virginia and North Carolina, says that seasoned pine wood is used for the fires in those States, and that they are started the night of the day the barn is filled.

After the tobacco has been cured and is dry, whenever the weather is mild and damp it will become soft and pliant and may then be stripped. It is first taken off the sticks and laid in heaps, and then the leaves are stripped from the stalks and tied in bundles of about one-fifth or one-sixth of a pound each. The bundle is formed by wrapping a leaf around the upper part of a handful of leaves for 3 or 4 inches, and tucking the end into the middle of the bundle.

There should be, if the quality of the crop permits, four sorts of tobacco, namely, second, bright, yellow, and dull. When the tobacco is taken down from the dry house, the first culler takes each plant and pulls off all defective, trashy,

ground, and worm-eaten leaves next to the lower end of the stalk, and then throws it to the next culler, who takes off all the best bright leaves (and if there be any yellow leaves he lays them one side until he has got enough to make a bundle) and throws the plant to the next, who takes off all the rest, being the dull.

The different strippers, as they get enough leaves in hand, tie up the bundles, and pile them apart, to keep the sorts separate for convenience in bulking. Stripping should not be done in dry, harsh weather. It is best not to take down more than can be tied up in a few hours.

To bulk tobacco requires judgment and neatness. Logs should be laid parallel, with sticks or boards across to support the "bulks," and allow free passage for air under the bottom. The bundles are now taken, one at a time, smoothed and spread out. This is most conveniently done by putting them against the breast and stroking the leaves downward, smooth and straight, with the hand. They are then passed, two bundles at a time, to the man bulking. He lays them down, two at a time, in a straight row, and presses them with his hand; the broad part of the bundles slightly projecting over the next two. Two rows of bundles are put in a bulk, and both carried on together, the heads being outside, and the tails touching or barely lapping. The bulk, when carried to a sufficient height, ought to have a few sticks laid on the top to keep it in place. It must now be frequently examined, and if it gets warm, or has a musty, bad smell, it will require to be changed into another bulk, laying it down one bundle at a time without pressing, so that it may lie loose and open to admit free circulation of air.

After it has become thoroughly dry, and has a strong smell, it is fit to "condition;" that is, when the moisture or warmth of the weather makes it pliable, it is bulked in three or four, or even six-rowed bulks, and covered with boards or sticks and weighted down with logs, etc., when it will keep in nice order for packing in hogsheads at any time.

We wish to emphasize the point that dry or drying tobacco should only be handled when the weather is suitable, and the tobacco moist and pliable, or it will crumble and waste.

SORGHUM FOR SUGAR AND SYRUP.

One great feature in the South about the raising of sorghum is the fact that it can be successfully grown as a second crop. It need not be planted until the middle or 20th of May, and a crop of early Irish potatoes worth say \$150 per acre, can be grown and marketed by that date. Then sorghum can go right in on the same ground; it will mature in August and can be followed by a crop of cowpeas that will be ready to cut before frost.

The government experiments with sorghum juice in Kansas and other States, prove that 1,875 pounds of sugar and 10 gallons of syrup can be produced from an average acre of good sorghum. The farmer's account with his acre of land will stand at the end of the year thus upon the credit side :

Irish potatoes	\$150 00
1,875 pounds sugar at 4½ cents.....	84 00
10 gallons molasses at 25 cents.....	2 50
4 tons fodder at \$5	20 00
25 bushels sorghum seed saved from first cutting at 50 cents.....	12 50
Loose fodder and stripings from first crop, one ton.....	5 00
	<hr/>
	\$274 38

No account is here taken of the value of the cowpeas or of the bagasse, which can be used as fuel or a fertilizer. From the gross proceeds must of course be taken the cost of production, milling, etc., but it is easy to see that in this plant the South has a very paying crop when handled in the proposed manner, with potatoes as a first crop and cowpeas or turnips as a final crop. This arrangement is not possible at the North, the growing season not being long enough.

We quote from United States Commissioner Coleman, in regard to the new process for making sugar from sorghum, as follows:

"The experiments consist in the trial of a new process in making sugar in this country, which dispenses entirely with the costly and ponderous mills and steam engines, etc., and uses a far simpler and less expensive method of extracting the juice, by which all the saccharine matter is obtained, while by the former method, from 30 to 40 per cent on the average, of the juice, even with the Southern sugar cane, is left in the cane after passing through the mill, and with sorghum a still greater quantity because of greater difficulty in extracting. * * * A yield of 15 tons of cane to the acre was being secured, which would produce, by this new process, 1,500 to 1,800 pounds of sugar. This sugar is worth by the car load 5½ cents per pound at present (1890).

"A complete sugar factory will cost about as much as a flouring mill, and can be run at a great profit, according to the present experiments."

This opens a most promising field for both the farmer and the capitalist, especially as it is well known that our Southern sugar plants are all richer in saccharine properties than those grown at the North.

But doubtless the average Southern farmer will be more interested in sorghum first as a fodder plant, and second as producing home-made sugar and syrup in a smaller and more economical way, furnishing thus all the "sweetnin'" his family requires, with perhaps some to sell to his neighbors. The Early Amber cane, which is a supposed cross or hybrid of the Chinese and African sorghums, is the variety generally used for sugar or syrup.

Small mills for pressing out the juice are to be had at any of the hardware stores, also evaporating pans, etc.

The acidity of the juice is neutralized by the use of cream of lime, or soda; and impurities rise to the top and are removed in the scum in boiling after some albuminous matter, such as the white of egg, has been added. The juice is boiled down until by the tests usually employed in making maple sugar the syrup is found to be ready to granulate, when it is run into pans or tanks and set away to separate and deposit the sugar.

The quantity of cream of lime or soda, or both, to use to neutralize the acidity of the juice, is a matter of experience and experiment, and will vary in different seasons, and different crops, grown on different soils and by different modes of culture. The product of syrup per acre ranges from 150 to 400 gallons.

A home method of extracting sugar from sorghum juice is quoted in the report of the United States Commissioner of Agriculture for the year 1867, page 359, as follows:

"Strip, cut and work up the cane the same day if possible. I take the cane when just fairly in bloom. In no case do I allow the seed to mature. For sugar I boil the syrup very heavy and rapidly; desiccate thoroughly and cool quickly.

I use the Cook evaporator. When the syrup is reduced sufficiently I run it through a cooler made as follows: a tin pipe 6 feet long, 2 inches in diameter immersed in a box of cold water; at the receiving end is a funnel turned up at right angles with the main pipe. The syrup when passed through the pipe, is cool enough to run into a barrel, when I leave it to granulate; set the barrels on end and remove the top head and, if possible, keep the room at about 70 to 80 degrees. When sufficiently granulated, mix a little water with the mush sugar, and drain the mush with Hunt's centrifugal sugar drainer."

The gentleman giving this report received the first premium given by the State of Iowa in 1866 for home-made sorghum sugar.

It is not to be expected that by any home method of extraction, equivalent results to those obtained at the United States Experiment Stations in Kansas, Iowa, etc., such as those given above by Commissioner Coleman, can be secured, yet there is no question but that our Southern soils and climate will produce sorghum richer in saccharine matter than can be grown at the North.

As early as 1857 the United States Agricultural Report gives the number of gallons of sorghum juice required to yield a gallon of syrup in the Province of New Brunswick as 10 gallons; in the rich bottom lands of Illinois and Indiana, as 7 gallons, and in Maryland and Virginia, as 5 gallons.

In growing sorghum for its juice, it should not be sown broadcast, but worked in hills or rows the same as corn; a mellow, sandy loam soil is best, and cowpeas or clover plowed under the season before, form excellent fertilizers for this plant.

Never plant sorghum near broom corn, as it will hybridize, and the juice of broom corn is not sweet. It will also mix with Kaffir corn, Jerusalem corn, or Dhoura (millo maize), all of which are non-saccharine sorghums.

Of course in the extreme South, such as the States of Louisiana, some parts of Texas, Southern Mississippi, Alabama, Georgia and Florida, sugar cane (*Sacharum officinarum*) will perhaps always displace sorghum; but in the northern half of the South, some of the different varieties of the saccharine sorghums, Early Amber, Otaheitan, common Chinese, Imphee, etc., will receive merited attention, and by careful selection of seed may doubtless be greatly improved in yield of sugar products.

SWEET CORN, VS. SORGHUM, FOR MOLASSES.

A correspondent of the *Rural New Yorker* writes as follows:

"EDITORS RURAL—Yesterday I cut up the corn growing on one square rod of ground, husked off it 1 bushel ears, took away the blades and tassels from the stalks, and run them twice through a wooden crusher, whence exuded some 4 gallons of clean, sweet juice, from which I succeeded in making half a gallon of beautifully clear molasses of excellent quality—a sample of which I send you.

"This is my fourth experiment, in each of which there was a like result as to quantity; as to quality, the last is the best. The process of manufacturing is simple but most arbitrary, and when strictly followed, success is certain every time. And to make it profitable, cultivate one acre of the Stowell sweet corn, and the following results, or even greater, may be realized :

"First. One hundred and sixty bushels of ears, worth in any city market \$80.

"Second. An amount of excellent fodder for stock, equal to 2 tons of good hay, worth \$20.

"Third. The stalks would then yield some 640 gallons of juice, or 80 gallons of molasses, worth at least \$40—making in all \$140; while the cost of manufacturing the molasses is very light.

"In view of the above calculations, which, by the by, have been fully realized on a small scale in my several experiments, I am almost persuaded that for this latitude corn is more valuable for the manufacture of molasses than sorghum.

"A cheap wooden mill made precisely like any old-fashioned cider mill, only having the grinders smooth and not fluted, is all that is necessary for pressing out the juice."

We think the calculations made by this correspondent are rather large, but even though the figures are cut in two, \$70 per acre is a good return.

OSAGE ORANGE HEDGES.

A most lasting and satisfactory fence can be made of the Osage orange in the South, where this plant is native. In Northern States, such as Illinois and Iowa, where at times the climate in winter is severe, and it is liable to freeze down, hundreds of thousands of dollars have been expended for hedges of this plant. It is stated in the United States Agricultural Report of 1868, that the estimated crop of the Northwest was then 300,000,000 plants, sufficient for 60,000 miles of fence.

In the South, where no climatic drawbacks to its successful cultivation exist, it will be found profitable to use it,

and, doubtless, as timber becomes scarcer, this will be done, especially on our Southern prairie lands, where such hedges operate also as wind-breaks.

The plants may now be bought of one year's growth at from \$1.50 to \$2.50 per 1,000, but the farmer can readily grow them himself, if he can obtain the seed balls from the trees.

These should be soaked in tubs or barrels of water until the pulp decays and the seed can be washed out. To effect this, warm water is usually turned on, changing it frequently, and the process is hastened by keeping them in a warm room. It takes several weeks to rot out the seeds. Another plan is to expose them to freezing weather in open boxes, with layers of moist earth between them, for a few weeks in the winter.

Let the boxes be placed in the sunshine, where the seeds will be alternately frozen and thawed. In the early spring they should be planted in drills 18 inches apart, 6 inches apart in the rows, in a rich bed, and the young plants carefully cultivated and weeded the first season, and set in the hedge-row as soon as the leaves drop the following fall.

It is recommended to plow deeply, along the line of the proposed hedge, eight to ten furrows, turning four or five furrows together, then, after harrowing thoroughly, repeat the plowing in the same manner, so that a ridge may be formed, on the top of which the hedge shall stand. This plowing should be done the spring previous to the setting of the plants, if the ground is prairie sod or grass land, but if otherwise this can be done just before setting the hedge in the spring. If this ground is not rich it should be made so by the application of manure.

A straight line should then be staked off in the center of the plowed land, and a light double furrow turned out along the line of the stakes, and the plants set by stretching a cord and carefully and rapidly filling the dirt in about each plant, setting them 1 foot apart, and no deeper than the surface of the top of the ridge you had formed, tramping the earth down well upon the roots of each plant. If the young roots are not then covered sufficiently deep, finish by plowing a few light furrows on each side, throwing the dirt towards the hedge.

The plants should first be clipped back to within 4 inches of the collar of the roots, and the tap root to 6 or 8 inches. This is best done with a pair of hedge clippers or sheep shears.

The soil of the plowed strip should be kept worked thoroughly the next summer, so that weeds and grass may be kept from smothering the young plants, and they may be kept growing thrifitly.

EARLY AND REGULAR TRIMMING IMPORTANT.

In the spring, when the plants have been sending out leaves and branches for three months, the first pruning should be done, cutting back the main shoots to 6 inches from the bud and the side shoots about one-third their growth. A second light trimming should be given in about three or four months more, leaving the hedge in wedge form at the close of the first year's growth, say 15 inches high and about 8 inches at the base.

The wedge or cone shape should be maintained in after years, letting only a foot be added to the height and 6 inches to the base each season, this being accomplished by *regular*

and severe pruning 1st of June and 1st of December, the latter always when there is no frost in the air.

When the fence is sufficiently high to turn stock, say 4 or $4\frac{1}{2}$ feet, it should not be allowed to grow any taller or wider, but so trimmed from year to year as to maintain its regular compact wedge shape. The system of regular trimming we have described *must be maintained from the first year of the life of the hedge right along*, or it will grow tall, open, straggling and not bottomed well. Regular and systematic pruning must be done in the earlier years. This is the key to success, if a fence that is absolutely stock and almost rabbit proof is required. An Osage orange fence has been found to be cheaper than one built of posts and boards, but is not cheaper of course than a rail fence. There is one point, however, and that is that a well-grown and trimmed fence is good for at least thirty and perhaps fifty years. In case any of the young plants do not grow in the rows, others should at once be inserted or a branch bent down and *layered*, by fastening it with hooks or pegs driven in the ground. The best plan is undoubtedly to put new plants in the vacancies.

FLAX GROWING.

The following article gives some items in regard to the growing of flax in Ireland, and may be useful to those wishing to experiment with the plant in the South.

"The soils that are generally considered most proper for the cultivation of flax, are alluvial formations, and deep, easily pulverized loams—those which contain a large portion of vegetable matter in their composition are considered the best. It will not, however, answer to be made too rich with manure, as in that case the fiber is course. Land of a mid-

dling description will answer, but the feature of greatest importance consists in after treatment. The usual practice is to sow flax after potatoes or a root crop of some kind, but it is considered best if it were sod land the previous year. I have, however, seen good flax grown after grain crops. When flax is sown after root crops, they do not plow the land; it is well harrowed and picked clean of weeds, as the success of the crop greatly depends on the cleanliness of the ground. After sowing, a very light harrow is used, covering the seed as evenly as possible, and after harrowing, the weeds that are on the ground are carefully picked off; it is then finished by passing a light roller evenly over it.

"In choice of seed there are a variety of opinions, some preferring the Dutch and others the American. The Dutch is generally chosen for stiff loams. The quantity of seed is from $2\frac{1}{2}$ to $3\frac{1}{2}$ bushels per acre, varying according to the land and the judgment of the sower. Their acre is equal to one and a half and 19 rods of this country measure. The time of sowing is from the 15th of April to the first week in May, varying according to the soil and situation. The weeding is a very important operation, and should be performed with care and attention—not leaving a weed to be seen. As a quantity of weeds are invariably found to spring up with the crop, notwithstanding the most assiduous care, they ought to be carefully rejected in the process of pulling.

"It takes a practiced hand to tell the proper time of pulling, as a few days sometimes materially injures the crop, both in quantity and quality. What is considered the best time is when about two-thirds of the stalk is observed to turn yellow and to lose the leaves, and the seed in the uppermost bolls are well formed. By pulling flax green a

finer article is obtained, but a less quantity. Some growers save the seed, but it invariably injures the flax. When the crop is ready it is pulled and kept straight, and bound up with bands of rushes in bundles about 2 feet in circumference, and if green it is set up in stooks of twelve bundles for a few days.

"The important process for either making or marring the produce of the flax crop, is that of watering; and in this operation a great number of particulars require to be attended to, any inattention to, or improper performance of which, may considerably damage the whole crop. First, the water ought to be soft and clear, and if possible, standing. Second, the bundles ought to be put in the water, roots down, and when as much is in as the pit will hold, it must be kept under the water with either stones or sods until it is properly fermented. It has a great many processes to go through before it is ready for the spinner, such as spreading, drying, lifting, breaking, scutching, etc., etc."

BASKET WILLOWS AND THEIR CULTURE.

The following article is mainly taken from the columns of a leading agricultural journal:

PEELING.

"Willows may be cut as soon as the leaves fall in the autumn, or at any time during the winter. As soon as cut they should be bound up in small bundles, with the lower ends even, when they may be stood up on end, and allowed to remain until spring. As soon as the weather becomes warm in the spring, the bundles must be stood in water an inch or so, and allowed to remain in this position until the buds start, when they will peel easily. This will be the latter

part of May or early in June, depending somewhat on the situation and season. Peeling has always been done by hand, and it is a slow operation, as an expert hand cannot peel 100 pounds per day. A machine for peeling has lately been invented which is advertised to peel from 1 to 2 tons a day. Two tons per acre is considered a fair crop. After peeling they are thrown in water, then dried, so that they will not mildew, when they are tied in bundles, and are ready for market."

THE MARKET.

"The culture and sale of the willow is a new business in this country. Willow manufacturers have always obtained their supply from Europe, and it will take some time to change this course of trade. It will not be strange, therefore, if in some sections of the country, farmers with a small stock on hand find it difficult to dispose of them, even when a similar, or perhaps an inferior article, is selling at an extravagantly high price in the New York market. Indeed, it would not be very strange if manufacturers should import foreign willows, at a great cost, to the very town where some enterprising farmer has a better article that he knows not how to dispose of. We have heard of such operations; but these things will soon regulate themselves.

"In Europe the willow is universally used for baskets, and in almost every locality where there are German settlers good basket-makers can be found. Farmers who have a small quantity of willows on hand, would do well to make inquiry among their German neighbors, and engage them to work their stock into baskets for use and sale. When in New York a few years since, we undertook to look into the willow trade a little, and were astonished to see such immense stores, and

a brisk trade. The dealers we saw were all foreigners, and exhibited a strange ignorance of the English language, for men doing a large business in New York. We thought at the time that they were not anxious to give us much information. Willows are now worth more than \$100 per ton; and a gentleman who has raised an acre for several years informed us last fall that the cost of cutting and peeling a ton by hand, was about \$30."

THE WILLOW FOR HEDGES.

"The willow is well worthy of attention as a plant for live hedges. Though destitute of thorns, such is its strength and rapidity of growth, that it will make a strong hedge in a comparatively short time.

"The ground should be well prepared, and it would be well to plow a strip not less than 6 feet wide, drag, and manure if the soil is poor. Then set the willow cuttings either in a single or double row; if in a single row, 6 or 8 inches apart; if in a double row, 15 inches apart each way, and so as to "break joints." The cuttings from this hedge will be worth something, certainly enough to pay for the use of the land it occupies, and for keeping it in order. In England, says the *English Flora*, the willow is "extensively used for fences for the exclusion of hares and rabbits, as well as cattle, the bark and leaves being so intensely bitter that they will touch neither, while the shoots being long, tough and flexible, may be formed into any shape; and a fence of this kind is reckoned little, if at all, inferior to that made of wire, which, when made close enough to exclude small animals, and strong enough to form a barrier against large ones, is very expensive.

"The ease with which the willow is propagated, and its rapid growth, makes it particularly valuable for *shelter* from the sweeping winds. Charles Downing says: 'A screen of twenty-five feet in height may be grown from willow cuttings in five years, and at a slightly retarded rate of annual increase until a height of 60 feet is gained; thus almost immediately affording that shelter which is so indispensable that there is no safety without it.' The purple willow is the best variety we are acquainted with, both for hedges and shelter.

VARIETIES SUITED TO OUR CLIMATE.

"The culture of the willow was urged many years ago, by the elder Mr. Prince, but the subject received but little attention, and the varieties which were recommended as the best English sorts, did not suit our climate. Our dry, hot summers checked or entirely stopped their growth, so that during July and August, they would remain apparently dormant, some varieties starting again with the fall rains, but not making sufficient growth to be of any value. Dr. Grant and Charles Downing, of Newburgh, N. Y., have for several years been importing all the English varieties and conducting a system of reliable experiments, of immense value to the country, and the result is, they have found *four* varieties to succeed admirably here, and though others have proved valuable, these four have proved superior to all others. We give Mr. Downing's description of these sorts.

"First. FORBES' WILLOW.—*Salix Forbyana*.—Hardy and productive, its rods having almost a leathery toughness; but it does not whiten well, and in consequence its usefulness is greatly abridged. For work where unpeeled rods are used, it is most excellent.

"Second. LONG-LEAVED TRIANDROUS WILLOW.—*S.*

Triandra.—This whitens beautifully, is very tough and pliable, and grows vigorously with less drainage than any other of good quality. If the soil is very deep, it will grow with equal vigor where the ground is very dry; and in addition it has the excellent habit of early ripening the extremities of its shoots, on which account it is quite hardy in high Northern latitudes.

"With our German basket makers it is a general favorite, especially for split work. As an ornamental tree it is also deserving of attention.

"Third. PURPLE WILLOW.—*S. Purpurea*.—This is the

representative of a large class, and appears to be far more valuable for osiers in America than in England, where it is represented as giving shoots of from 3 to 5 feet in length. I have standing by me a bundle of its shoots, from cuttings planted last spring, that average more than 6 feet; and another bundle, from established plants, of nearly 10 feet. They were grown with good but not extraordinary culture, and any good field may easily do as well. It is much more fastidious in its habits than either of the preceding—delights in richness, depth and moisture, but does not tolerate excess of wetness. When well established it has but one superior in productiveness, and may easily be made to yield 4 tons per acre of the most excellent rods, particularly for fine whole work, for which it has no superior. For live fences it is very valuable, and in England is 'extensively used for fences for the exclusion of hares and rabbits, as well as cattle, the bark and leaves being so intensely bitter that they will touch neither, while the shoots, being long, tough and flexible, may be formed into any shape; and a fence of this

kind is reckoned little, if at all, inferior to that made of wire.'

"Fourth. BEVERIDGE WILLOW.—*S. Beveridgei*.—This variety is perfectly adapted to the climate of the United States, and is much more vigorous and productive than any other variety known. Cuttings of the size of a pipestem, 6 inches long, planted last April, made during the season shoots 11 feet long. Its rods are very slender, comparatively, and vary less in size 'from butt to tip' than any other with which I am acquainted. 'In early spring, before other flowers appear, excepting the *Magnolia conspicua* and *Cydonia Japonica*, this tree is a mass of dazzling bloom, its immense catkins exhibiting all the brightest hues of the rainbow.' The remarkable vigor of this willow, together with its hardiness and beauty, constitute it the best material for live fences that has yet been discovered, where the soil is suited to its growth; for example, on the deep, rich soil of the Western prairies, and on the bottoms, where fences are liable to be swept off by freshets. It will thrive in *any* soil that is *deep and rich*, and for a garden enclosure I cannot conceive anything more attractively beautiful than a hedge of this willow. After the gloom of winter has passed, it affords the first cheerfully inviting scene of spring—its gorgeous flowers, covered with bees, filling the air with the joyous murmuring of the music; and its dense, rich foliage, is the last to yield to the influence of early winter. The cultivation of this willow for hoops may perhaps be worth attention. It will yield once in two years about 40,000 poles to the acre. One whose judgment is worthy of all confidence, writing from England, says, 'As an osier it is better than all other

varieties,' and the experience of the past two years proves it of equal excellence here.'"

SOIL AND CULTIVATION.

The willow delights in a moist, mucky soil, but experience has proved that it cannot be grown successfully in stagnant water. It requires depth of soil, richness and moisture—a well drained swamp, therefore, is just the thing, and even if overflowed in the winter and spring, and occasionally in summer during heavy storms it may be used advantageously. Heavy, retentive upland soils when deeply worked are suitable for the willow, wherever there is a good and well distributed rainfall, as is generally the case in the Southern States. We have here many localities which are eminently well adapted to willow culture, such as the rich alluvial lands along many of our Southern water courses.

Some varieties will bear more water than others, as the Long Leaved-Triandrous Willow will flourish on a soil so soft that plowing is impracticable, and requiring no other care than keeping down the weeds, but on the same soil the Purple Willow would scarcely grow.

The ground for the willow should be well plowed and dragged, and if the soil is not naturally rich a good dressing of manure should be plowed under. There appears to be a good deal of difference of opinion as to the distance at which to plant cuttings. We rather think, however, that about 3 feet each way will be found right. The cuttings should be from 7 to 12 inches in length, according to the stiffness of the soil. If the soil is heavy, 7 inches in length will be short enough. After planting, the ground must be cultivated, until the willow gets such a start as to shade the ground, and prevent the growth of weeds.

The customary mode of planting in England is to leave one or two buds of each cutting *above* the surface of the ground and when the shoots grow out from these buds and the larger growth is generally from the upper buds they are not found to be as strong and vigorous as when the entire cutting with all its buds is covered. Roots are then formed at each bud, even to the top one, and much stronger canes are produced than where the buds have to draw all their nourishment through the stem. At the end of each year's growth the canes are cut back to the surface of the ground and the stool or stock spreads evenly on all sides, often to as much as 3 feet in diameter in good soil and with good culture, and the canes having more space than by the English method and more nourishment from their own roots, are more numerous, longer, and much more uniform in size. This system of cutting close to the ground must be adhered to at all subsequent cuttings, and it will be plainly seen that in this mode of culture the stools must be planted at a considerable distance apart, on no account should they be closer than from 3 to $3\frac{1}{2}$ feet apart, and on good rich ground the larger sorts should not be put nearer than 4 feet.

RAMIE.

This plant is of the nettle family, its native home being in the valleys of northern India, among the foothills of the Himalaya Mountains, and from there its culture has spread into China, Java, Assam, Malacca, and Australia; it has also been found to grow well in Jamaica, in the West Indies.

Its botanical name is *Boehmeria nivea*. It is known commercially in India and England as China Grass. The plant also known as the Neilghera Nettle, which also

grows in northern India, yields a similar fiber, and is sometimes put up with the China Grass, but being a stinging nettle it is not as easily handled as the latter, and its fiber is not as strong, as brilliant, or really as valuable.

The fiber yielded by the ramie plant is a strong, white silky substance, of long staple, great beauty and high lustre. Under favoring circumstances it is a rank grower, and it is claimed the staple can be produced at a cost less than flax or hemp, and can be used in textile fabrics, such as Irish linens, laces, etc., with advantage both as to strength and beauty. It is also said to be used as a substitute for silk and as an adulterant for cheapening that material. The coarser parts and qualities of it are claimed to be much stronger than hemp and useful for all the purposes for which that fiber is used.

It was introduced for cultivation, or rather for experimental cultivation, into several of the Southern States several years ago, and was found to grow vigorously in Louisiana, in Fayette County, Tenn., and near Goliad and Austin, Tex. It was found to grow well, both from seeds and roots. It multiplies very rapidly from root planting, enough plants for 150 acres having in one year been produced in Louisiana from one hundred roots. In growing it from the seed, which are of very small size, it is found necessary to give them only a very slight covering of fine soil, to protect them from the rays of the sun, and to keep the ground moist by daily waterings. In China, matting or sacking is suspended over the beds until the plants are 2 inches high, and this covering is watered every day and removed at night. When 3 inches high they are trans-

planted into rows, care being taken to supply the plants with water until they are well set.

In favoring localities, and on good soil, it grows from 8 to 10 feet high and yields two or three crops of stalks per year, and after the first year requires but little cultivation or attention. If grown from roots, cut in pieces and planted 18 inches apart, they are ready for cutting the second year.

There does not seem to be anything in the way of the production of the crop; the only drawback is in the finding of the best method of preparing the fiber for market in an economical manner. The manufacturers are now using this material as prepared by hand labor in China and India. What is needed is such chemical or mechanical appliances as will do for ramie what the cotton gin has done for cotton.

We presume that seed or cuttings can be obtained by any one desiring to experiment with this plant, by application to the Commissioner of Agriculture, at Washington, D. C.

TEA AND SILK CULTURE.

If there is any part of the United States where the production of these articles can be made a success, it is undoubtedly at the South; but perhaps it is not too much to say that unless new methods and machinery are invented and brought to bear, it will be a misfortune and not a blessing that tea can be produced here in competition with China, Japan and India, or silk in competition with these countries and Italy.

In China and other oriental countries, we are told a man can be hired for one dollar a month, furnishing his own board. It will be a misfortune to the South when our labor-

ers can employ their time no more profitably. Although the soil and climate of the South are well adapted to the culture of these two products, we do not expect that either of these articles will be produced here. Our workmen and women can employ their time to better advantage. It is undoubtedly a fact that no American can to-day afford to pick, and with great care and minute watchfulness, roll and cure a pound of any kind of small green leaves for from 10 to 20 cents a pound, the price realized for tea by the Chinese tea growers.

Silk is another article that, while in its finished commercial shape in the United States it bears a good price, its value in the cocoon, even after all the trouble and endless work of raising, housing and feeding the silkworms has been gone through with, and they have been brought finally to death in their winding sheet, the cocoon, the price in this unwound, unspun and uncolored condition is not a remunerative one to Americans. No, we can make more money with less work than by raising tea or silk.

Our advice is not to waste your time at present on attempts to raise these articles. Is it not better to try and do well with the many crops we *can* raise here to good advantage, than to experiment with foreign productions involving an immense amount of work for little pay?

TIME TO PLOW AT THE SOUTH.

Unless your land has a sandy subsoil, and so is liable to gully and wash, do all your breaking in the winter months, getting it all done by February 1 to 15. At this season the land is usually in the best possible condition, and you can plow deep if you want to. Deep plowing will insure your

crops against possible damage from drought in the summer, as the deeply pulverized soil furnishes a reservoir of moisture for plants to draw sustenance from.

Another point is gained in having the heavy work of plowing done when the weather is cool, and when yourself and team can work to best advantage; besides this, winter plowing enables you to plant early, which if the season proves to be a dry one, often insures a crop, when later plantings fail. It also enables the farmer to do his work with less stock, and to have plenty of time to do it well.

Deep winter plowing, followed by early planting and continued shallow cultivation in the summer should be the aim of every Southern farmer and are the sure roads to success.

A word or two more about deep plowing. It is likely some one will say, "my land will not bear deep plowing, the soil is thin and the subsoil is poor, tough clay, and if I plow deep and turn the little good soil I have down under the poor clay, I shall get no crop at all." My friend, your soil needs enriching, and the first step towards this is deep plowing, the second is to sow cowpeas or clover, and turn them under; and if you practice economy in the saving of manure, as recommended on page 312, and a good, liberal top-dressing of this is given before the peas or clover are sown, your land will soon be twice or three times as productive as it is now, it will also work easier, be mellower, and stand droughts better. We hope none of our farmers will be satisfied to plow their lands only 3 inches deep, and let the soil get poorer and poorer, and harder and more unproductive each year. Land can be, and ought to be made better each year, and the good farmer will see that it is.

HOTBEDS.

To prepare a hotbed, mark off the ground in a location sheltered from the north and west winds, and where the drainage is good, the size you intend to make your bed and 6 inches larger all around. The ordinary size of commercial hotbed sash is 3 by 6 feet. If, therefore, you wish to use three sash mark off 10 feet east and west by 7 feet north and south, so that your bed shall front and slope to the south; if you intend that your bed shall be long enough to take six sash, make your bed 19 feet east and west and 7 feet north and south, and in the same proportion for whatever number of sash you desire to use. Several small beds, say of two or three sash each are better for the beginner than one large one, as some plants want more heat than others. It is not best to put say cabbage plants and egg plants in the same bed, they need different heat and handling.

The material of which to build up the bed, is fresh horse manure, mixed with long litter and leaves. Mix these well together with a fork, sprinkling with warm water until all are wet, then fork into a compact, conical pile, and let be for from three days to a week, according to the temperature of the atmosphere. When it smokes, showing it is well heated, fork it over, wetting again any dry portions, and as soon as it heats again, spread it while hot on the ground selected for the bed, tramping or beating it down until it is from 2 to 3 feet above the surface of the ground. On the top of the manure, put fine, light, rich soil 4 to 6 inches deep (such as that made from the decay of grass or clover sods and cow manure piled up for a year). Have your frame prepared, built of 1 to $1\frac{1}{2}$ inch planks, place it upon the bed with narrow cross boards under its lower edges to prevent its

settling down into the bed too much, and put on your sashes at once, to retain all possible heat. The frame should have corner pieces of scantling to which the side planks are nailed, and the north part should be, say 6 inches, higher than the front or south side. The east and west planks should project 1 inch above the north and south ones and should have 1 inch square cleats nailed 1 inch below their inside upper edges, upon which the outside edges of the sash can rest. Each sash should also have a strip 2 inches wide nailed along one of its sides, so that it may overlap its neighboring sash to prevent cold air from entering between them and also to enable the sash to be readily slid down or up, resting upon the adjoining sash.

When the top soil is warmed through by the heat generated by the manure beneath it, sow the seed in drills 4 to 6 inches apart, so that they can be worked and weeds kept down. When the plants are 3 inches high they should be transplanted into rows 6 inches apart and 3 inches in the rows, and when they seem crowded transplant again.

Hotbeds of more extensive character are also made, to be heated by fire, sometimes as much as 75 feet long, having underground flues, with fire-box at one end and chimney at the other; but we think that ordinarily at the South such beds as we have described will be found sufficient. It will be well, however, to prepare covers made from sacking, filled in with hay, a kind of light mattress to lay over the glass frames in very cold weather. It is also well to have an outside case 6 inches larger than that covered by the sash filled in with sawdust or other nonconducting material to keep occasional severe frosts out.

COLD FRAMES.

These are made similar to hotbeds, but heating manure is not used, the same protection otherwise being given. They will be found very useful for starting cabbage plants, cauliflower, lettuce, etc. In place of glass sash, slat frames with cotton cloth tacked over them may be used about as well.

The putting up and handling of a greenhouse needs to be done by an expert nurseryman, one who has been trained in the business. We shall not, therefore, in this book, written for farmers and truckmen, give directions for building one.

MANURES.

One of the most important points demanding the attention of the Southern farmer, is that of manures. In many of the Southern States where the lands have been cropped for scores if not for hundreds of years, and as the saying is, are "worn out," hundreds of thousands of dollars are spent annually for purchasing commercial fertilizers, while the more natural and comparatively inexpensive sources of fertilization are overlooked, and wasted. The question of inexpensive fertilizers is an important one both to the native Southern farmer, and the Northern immigrant who comes here from States having naturally rich, fertile soils, such as the Northwestern prairies.

Necessity obliges the farmers of such countries as Michigan, northern Ohio, Pennsylvania, New York, New Jersey and the New England States, to keep their live stock up through the long winter time, when the snow is on the ground, and there is nothing in the fields for the cattle to eat. The cold for months is intense, snow lies on the ground for

long periods of time, so all stock have to be well housed, or kept in small, snug sheds and barnyards, and fed from day to day, and so for six or seven months the droppings fall and are forked into huge piles matted together with the plentiful hay litter the animals are bedded with.

First Result—500 to 1,000 loads of excellent manure that must be hauled out of the way and put on the fields the next season.

Second Result—Lands growing richer and more productive each year, where the farm is handled by a good farmer who keeps sufficient stock to eat the hay, clover, corn fodder, millet, oats, turnips, carrots, ensilage, etc., which the farmer during his short summer has stored up.

Third Result—Lands worth from \$75 to \$125 per acre, that 50 to 100 years ago were bought at from \$2 to \$5 per acre.

How shall like results be secured at the South? Manifestly by profiting by the experience of the Northern farmer. What the climate there *compels* him to do, let us do here at the South, *because it is our interest to do it*. "What! keep our stock up in small pens and sheds?" you ask. Certainly, at night, and all the time during January and February; only be sure you have provided abundant supplies of food; and also be ready with fork and spade to put the droppings in piles daily, out of the way of the trampling, washing, leaching, wasting to which it is subjected in the large barnyards and horse-lots of Southern farmers.

Another thing; if you raise wheat, oats, rye, etc., do not burn up or otherwise waste the straw, save it all, and bed your stock with it. This will furnish a *mat* to hold the

manure together, making it more easily handled, and soaking up the valuable nitrogenous urine.

We have said above in this article that abundant supplies of food must be provided. Now this cannot be done by planting 500 acres of cotton and 100 acres of corn, neither can it be best done by reversing this and planting 500 acres of corn and 100 acres of cotton. No, the thing to do is to provide ample meadows and cut plenty of hay. Let your big strong three-story barn, for you should by all means have such a structure, be filled each year with clover, timothy or red-top hay—corn and sorghum grown and cut as fodder, together with millet or Johnson grass, and besides these supplies, have out of doors ample stacks of cowpea and crab grass hay, and also see to it that your corn cribs are full of corn; and then to parody Longfellow:

Your barns shall be full to the rafters,
Your cattle grow fatter each day,
Your land and your purse shall grow richer,
And mortgages vanish away.

There is another plan by which poor land can be made rich, and worn out soils returned to fertility, and that is by the use of green crops, such as clover and cowpeas plowed under. The latter at the South are to be preferred, being rich in nitrogen and potash, and heavy in yield of tonnage per acre; and as two crops of peas can be raised per year, while it takes two years to raise one crop of clover, it is easy to see that they are four times as efficacious. Perhaps a union of both plans is best, the use of both animal and vegetable manures, especially on lands to be sown the next year in wheat or grass, or planted to corn. Cotton seed is also an excellent manurial product, and it can be used either rotted or ground, in connection with cowpea vines turned under, to

good advantage, or fed to stock and the manure used. Commercial fertilizers, such as kainit, acid phosphates, etc., are not necessary.

The following statements from Professor R. L. Bennett in Bulletin No. 23, March, 1893, page 89, are in point:

"Commercial fertilizers are not necessary for our crops, because the lands can be maintained or increased in fertility, and increased crops produced without them, and the money expended can thus be saved on the farm. On most of the worn-out land of the State, the ordinary commercial fertilizers do little good to the crop the first year, and none at all the second. Such was the case in an experiment the past two years with acid phosphate, floats and kainit * * * * the latter, however, made a good increase the first year, applied at the rate of 500 pounds per acre, but there was no effect from it on the second year's crop. * * * * In view of the superior fertilizing material that can be cheaply produced on the farm, commercial fertilizers should be used only to a limited extent and *the mixtures, which are the most common forms in which fertilizers are sold, should not be used under any consideration.*" [The italics are the professor's.]

USE OF MARLS AS FERTILIZERS.

In very many parts of the South, very valuable marl deposits are found; similar, and in fact identical with those which in New Jersey have been found to exert such wonderful recuperative effects upon the very poor sandy and loam soils of that State, lands which a few years ago were considered almost valueless, but now, when marls have been applied, producing fine clover, corn, wheat and peaches, and sell at from \$100 to \$1,000 per acre. We draw these points

from the published remarks of Professor Cook, State geologist of New Jersey, and they are authentic. What has been done in that State and in France and England, can be done in the South wherever marl can be easily mined or dug, and has the advantage of good and cheap shipping facilities.

These valuable earths are of five general types, and may be classified as follows:

First. *Phosphatic marls*.—Those rich in phosphates, such as those of South Carolina and Florida.

Second. *Greensand marls*, like those of New Jersey.

Third. *Lime marls*.—Example, the English, calcium-carbonate marls.

Fourth. *Chalk marls*, such as the chalks of England or the Rocky Comfort chalks of southwestern Arkansas.

Five. *Gypsum marls*.—The fertilizing element of this marl being sulphate of lime or "land-plaster."

We have not space to give directions for the use of these marls, nor such descriptions as would enable the reader to recognize them if they should exist in his neighborhood. We would recommend that if you find any clays or earths you suspect are marls, or that contain valuable fertilizing properties, that you try them in small quantities, say a few bushels, just as was done at first in the State of New Jersey, where one farmer says he applied marl in the year 1824 without any other fertilizers, with the following results:

"I applied five or six loads of 20 bushels each on an acre for buckwheat or rye. The effect of it was so great that the use of it became general, and the farms increased rapidly in value from \$10 to \$100 or more per acre. As

the land increased in value, the amount of marl was increased to twenty loads an acre."

Another farmer says:

"We have improved land with marl that was so poor you could not raise anything on it; now we can mow it and cut 2 tons of hay per acre, all by the use of marl. It will prevent sandy soil from burning up the crops and clay soil from baking, and insure crops on all kinds of lands. My father bought the farm I now live on about sixty-five years ago. At that time marl was not much in use. He carted a few loads to try it, and said he could see it in the grass crops for years after, where he had put it on, which made him think it was of great value. * * * * * The land in my neighborhood is a sandy loam. By the use of marl it has become one of the best agricultural districts."

The profitable use of marls as fertilizers will of course always depend first, upon the character of the marl; second, whether its chemical constituents are adapted to supply the lack in a given soil; third, whether it can be obtained economically; and fourth, whether the cost is paid for by increase of crops.

The other modes of fertilizing named above, applications of barn-yard manure and plowing under of green crops, are of sure and certain benefit to almost all soils, and every farmer, unless it be one owning the very richest of bottom lands, should by all means use them.

VALUE OF LIME ON GRAIN LANDS.

From a correspondent in the *Rural New Yorker*:

"I commenced liming about thirty years ago by experimenting with 20 bushels on half an acre. That half acre looked so much better the next spring that I contracted for 900 bushels for the succeeding fall, and put it on at the rate of 40 bushels per acre. That gave me a great crop on land that was said to have been cropped thirty years without any manure; I then got lime for 9 cents per bushel, taking a whole kiln at once. I kept liming until I had all the old land limed and it paid well—the first crop always paying well for the cost, besides making much more straw to increase the manure. The last I limed was fourteen years ago, I then made an experiment with 100 bushels to the acre on 2 acres, and 55 bushels to the acre on the remainder of the field (16 acres). The 2 acres with the 100 bushels to the acre yielded an immense crop; had it not been on the hardest and poorest part of the field I presume it would have all lodged. Although lime *stiffens* the straw much, the wheat is clearer, plumper and of finer quality. A good liming will last for twenty to twenty-five years, and then the land may require 20 to 25 bushels to the acre. I said that if I was a young man I would lime all my unlimed land at the rate of 80 bushels per acre."

Not only is lime valuable on grain lands but it will be found to be excellent when applied to truck or grass lands. Its mellowing effect on stiff clays is surprising to those who have not tried it before.

WINDMILLS AND IRRIGATION.

While the rainfall at the South is usually amply sufficient to insure good crops, and consequently irrigation is not of so much importance as in the rainless, arid regions of the Northwest, yet where a supply of water can be readily obtained from some unfailing stream, or can be pumped readily by a windmill into a reservoir made cheaply by throwing up a dirt embankment around some natural hollow, and so growing crops, especially vegetables and small fruits, can at any time be irrigated, there is no reason why the Southern farmer should not secure such an advantage, just as the Colorado or California farmer does.

At certain seasons and times of the year an extra supply of water would be of great value, especially upon fields of second crop potatoes or cabbages.

It is well, therefore, that the Southern farmer should look carefully into this matter and see if irrigation is possible on his farm.

We find in the *American Agriculturist*, Southern edition, December 7, 1895, a description of a cheap home-made windmill which was built by S. S. Faggurt, of Finney County, Kan., as follows:

"The wheel consists of eight gas pipe arms, about 7 feet long, set radially into an axle which is mounted on an upright frame-work, just high enough so that the revolving arms will clear the ground. To each arm is fixed a triangular sail of heavy cloth, so shaped and attached as to catch the wind and give a rotary motion to the wheel, on precisely the principle of the ordinary mill. The frame work being stationary gives no opportunity for the wheel to

"follow the wind" and so catch the full impact from all directions, but the prevailing direction in southwest Kansas is northerly or southerly, and by setting the mill so as to catch such winds, little power is lost. Twenty feet away from the wheel is the water elevator, which consists of an endless belt of canvas, carrying wooden blocks or paddles every 16 inches, and working in an inclined trough, one end of which is in the shallow well from which the water supply is derived, and the other at the surface. A tumbling rod running from the windmill gives motion to the wheel over which the endless belt works, and the paddles, fitting the trough closely and moving upwards, carry with them a surprisingly large quantity of water. The entire contrivance costs less than \$12, yet in a good wind it will elevate 150 gallons per minute—more than many of the \$300 plants in the neighborhood.

Buckets would be an improvement on the paddles which waste a great deal of water."

FARMERS' SHIPPING CLUBS.

For the successful handling of a considerable portion of the farmers' and fruit raisers' products, nothing perhaps is as beneficial as a farmers' shipping club.

The plan is for a number of farmers and fruit growers of a given locality, near a railroad town or station, say from 50 to 100 persons, to form themselves into a farmers' society or club, selecting their own name for the organization, "Farmers' Coöperative Shipping Club" probably being as good as any, the members coming together for business purposes for an hour or two once a week, say on Saturdays, when they are usually in town.

The object of this society is to ship the different products (barring cotton for the present) raised by the members, to the best markets, North, South or West, in car load lots. Take for instance the following articles:

One barrel of apples from each of 150 members, will fill a car. Three bushels of potatoes from each member, or six bushels each from seventy-five members, fill a car. Four crates of berries from each of 150 members, fill a car. One fat hog each, from sixty members, is a car load. One fat ox, shipped by each of 150 members, fills five cars. One sheep each from 100 members fills a double decked car.

"What next?" you inquire. "Where shall they ship them, and how get their pay?"

Let us take up the organization of the club, and we shall find the answers to these questions.

First. A meeting of the farmers is called, and the organization effected by signing a very simple constitution and by-laws, and the payment into the treasury of the club 50 cents by each member, which is a full membership fee, and the subsequent payment of a small sum, say 50 cents per year of expense dues.

One of the members is then elected by ballot as the general manager or agent. This should be a good, live business man, and one in whom all have confidence.

By application to the transportation company, giving the names of members, a stencil plate with name and membership number will be furnished to each shipper, the expense of this being borne by the commission merchants; blanks for bills of lading are furnished by the transportation company, to be filled out and forwarded with each car as follows:

Date Shipped.	Manifest.	Total number of packages.....	Date billed.....	Number of waybill	Train	Departed..... o'clock.	Name of Each Shipper.	Prices Sold For.
	Railroad Company.....	Shipped from.....	Shipped to	Town and State.....	Shipped by.....	Remarks.....		
via Railroad							John Jones.	\$ 7 50
To via							Bill Smith.	3 00
To via							Tom Robinson.	4 00
To via							Tom Robinson.	15 00
Kind of Produce.	Number of packages,	Shippers Sten- cil Number.	Refrigerator Charges (if any).					
Peaches.....	15 1/3 boxes.	No. 5						
Apples.....	10 1/3 boxes.	No. 3						
Tomatoes	10 1/3 boxes.	No. 6						
Apples	5 barrels.	No. 6						

It will be understood the figures giving number of packages indicate also the style of package thus, $15\frac{1}{3}$, means 15 one-third bushel, crates (boxes), etc.

Four copies of this bill of lading are made out, one being retained by the general manager of the club, one mailed to the commission merchant to whom the car is consigned, and one each to the transportation company's agent and to its auditor.

As soon as the car arrives at its destination, the commission merchant makes returns *direct to each individual shipper*, by check or money order, for the proceeds of each man's shipment on its own merit, whether better or worse than other shippers' lots.

Arrangements are often made with the commission merchants by which such portion of their customary selling commission is thrown off and rebated to the club, as is generally found to be more than sufficient to pay the running expenses of the club, such as postage, telegraph charges, stationery, office rent, secretary's (or general manager's) salary, if any, etc., the balance going into the pockets of the members in proportion to each man's shipments.

Not only the articles enumerated above, but eggs, hay, cabbage, peanuts, tobacco and, in fact, almost all farm products (barring cotton, as we have said, which for the present had better be sold outright where it is raised) can be shipped thus and sold to the best advantage by this coöperative plan.

This is a farmers' alliance, indeed, and gives an opportunity for the farmer to sell many a dollar's worth of produce, paying only car load freight rates—not express or broken car rates, getting these products into the best markets in the

shortest possible time, and receiving his pay direct by return mail.

Take red Astrachan or early June apples; is not this a better way of disposing of them, than to peddle them out in a small way in a small town, or let the boys sell them out in 5 cent lots to passengers on the trains, in competition with all the other boys of the town? Why not ship them North where early fruits are in demand?

Full lists of reliable commission men are furnished by the transportation company's agents, and these dealers vie with each other to give best results on consignments and make prompt returns, so that they may secure future shipments from the club. A dishonest commission merchant, like a dishonest shipper, is soon found out.

One advantage to be noted is that each member shares in the benefits to be derived from telegrams and daily correspondence in regard to the state of the markets. In this way the cost to each individual is very small. The experience of the members also, as to the best methods of packing, and best points to ship different articles to at different dates is valuable.

Another advantage, and perhaps the most important, is the security it gives the members in planting certain crops, diversifying their products, which crops no farmer may at first want to risk, or have the means to grow car load lots of, yet in this way they can ship at car load rates. The farmer is as safe with 5 bushels as with 500. Any member, however, is not debarred from shipping to any point by express or by freight, individually, if he chooses to do so; or any car load lot may be sold by the general agent of the club for spot cash, on the ground, if the officers of the society, who

constitute its board of managers, deem this better than the risk of shipment. Buyers from all parts of the country frequently come in, and are encouraged to come and buy at market price, to ship in car loads by freight or in smaller lots by express.

Here, then, is a beneficial and lawful farmers' combine —a farmer's alliance that has no politics in it. Gold Bugs, Silverites, Democrats, Populists and Republicans can all unite here. Politics are barred; they never come inside the doors of the club room. This arrangement is working admirably where it has been tried in the South.

"KILN DRIED" SWEET POTATOES.

This does not mean dessicated or evaporated sweet potatoes, but is a new idea and enterprise, easily managed by any raiser of this vegetable, and is a matter of prime importance to Southern farmers.

Kiln drying is simply extracting the surplus moisture from whole potatoes. This is done in a building to suit the requirements of the size of the crop, say 40x60 feet, 16 feet high, without windows and with but one door at the end. When the frame is up take thick building paper and tack on the studding inside and out, under ceiling and weatherboarding; put the same material in roof, floors and overhead ceiling; this makes a frost proof and air-tight building. Then when the potatoes are ripe and properly air dried, the merchantable potatoes are "ricked up" in this house. The ricks are made by putting upright 2x4 studding 6 feet apart. The potatoes are then corded in straight as you would rick up cord wood until the house is full, excepting a space of 10 feet

square in the center directly under the ventilator in the roof, which should be made to close when needed.

In this space put a stove, a coal base burner is best, build fire in this and close everything; provide a thermometer and let the temperature run up to from 90 to 110 degrees. Within thirty-six hours little white shoots will sprout from the potatoes, and in sixty hours (still keeping the temperature above 90 degrees) the surplus moisture in the composition of the potato will be carried off, the tubers being at the same time covered with the white shoots. Then the potato is "kiln dried," and will keep for two years if left in the ricks in this air-tight buildings, or from six months to a year in barrels. The best variety to dry is the Yellow Nansemond or Jersey Yam. The larger whiter fleshed varieties cannot be easily kiln dried.

The shoots are rubbed off with the hand at packing time by boys and women, and barrels filled and headed up the same as in packing apples. The potatoes are of a fine nut brown color and of superior flavor, and are the only sweet potatoes, excepting a few very early ones, that will sell in any Northern city. These sell f. o. b. in car loads at \$3 per barrel, but others will not sell at any price. Thousands of car loads of kiln dried can readily be sold.

HOW TO BUILD A ROOT OR FRUIT CELLAR IN THE SOUTH.

Do not build it under the house; it is much easier managed when built independently.

The best place is in a hillside, or where the ground is sloping. Commence on the lower side, where a roadway can conveniently come in, and dig say 15 feet wide and

30 to 40 feet back, into the bank, sloping the floor a little to the front, for drainage. It is best to have it front south or east. A good rock wall, laid up with mortar, 18 to 24 inches thick, should then be carried up 8 feet high, with air ducts or chimneys built on the sides, from the floor to 1 or 2 feet above top of wall.

Bank the earth you have thrown out, around the sides to near the top of the walls. Frame a roof and cover with boards nailed close together, and shingle the same as you would a house. It might be well in the north part of the South to put building paper under the shingles to make the roof more impervious to cold; in fact, the whole building should be both cold and heat proof.

The ventilators which may be built as directed above, or put in the roof, must be closed when the thermometer drops to 20 degrees or less above zero.

Put the potatoes in piles 10 feet deep on the dirt floor, if it is not damp, or on a cemented floor or board decking raised a few inches. Keep the temperature at 50 degrees. The tubers will not sprout if kept at an even low temperature, and Southern grown *late* potatoes will keep in splendid condition thus until the following May or June. The cellar should be kept dark.

Apples keep admirably in bins or long trays in such a cellar, so they can be looked over from time to time and any decaying fruit picked out.

Such a cellar as this will frequently in one season pay its entire cost, in the increased price of vegetables or fruits stored therein, over what they could have been sold for as soon as gathered.

LAYING A CEMENT CELLAR FLOOR.

Professor S. T. Maynard, in American Agriculturist.

A solid foundation on a thoroughly underdrained soil, where there shall be no water oozing up at any time, is essential. The best foundation is small stones tamped into the soil and covered with coarse sand. Fresh, well-burned cement should be used—Rosendale for foundation and Portland for surface. Mix thoroughly one part of the first cement with two parts of sand in a box or mortar bed, then add water, stirring all the while until a soft mortar is made, a little thinner than brick mortar. Prepare only as much as can be spread in ten or fifteen minutes, then mix another lot. Spread each lot from 2 to 4 inches thick, according to strength required, as soon as thoroughly mixed, making it as smooth as possible with a mason's steel float, and working backward from that which is laid until the floor is covered. Let this stand for a day or two, or until it can be crossed without cutting into it, then spread a coating of Portland cement and sand, one to three parts, $\frac{1}{2}$ to 1 inch thick, making it very smooth and fine with the mason's steel trowel or float. This will be hard in from three to four days. Instead of putting on two coats, if Portland and Rosendale cement are mixed in equal parts, one coat well smoothed will be sufficient. The brands of Portland cement used for producing the best work are the Atlas, Dykerhoff and several others of imported cements. If the ground is dry before the work begins, it should be thoroughly moistened, that it may not dry unevenly. Slow drying is better than very rapid drying. Good, clean, sharp sand will make better work than fine or impure sand.

TO BUILD A GOOD STONE WALL WITHOUT MORTAR.

Construct two horses or frames built of strips of wood, the shape of a cross section of the fence you wish to build, say 2 feet wide at the base, 1 foot at the top and 4 feet high.

Remove from the line of the proposed fence all grubs, brier roots, small trees, stumps, etc., and then set up the frames and fasten them at the ends of the first section of fence, say 30 feet apart, and stretch cords from their bottom and top outside corners as guides for laying the wall uniformly.

Use small stones at the bottom, reserving the large ones to tie the walls with. The best place to use large stones is just that height in the wall where they will face both sides and so act as binders; if put at the bottom, reaching part of the way across, and the remaining space filled out with small stones, the frost in the winters will heave the ground and split the wall where the small and large stones come together, and the result will be your wall will tumble and be soon ruined.

It is a little more work to build a wall where the large stones have to be lifted into place, and if you are hiring men to build the wall they are pretty sure to place the large stones at the bottom unless you insist that the wall shall be built properly, with the smaller rocks at the bottom and the larger ones as *binders* farther up. It is a good plan to have some loose dirt thrown in among the stones at the bottom, as it will keep dry and the frost will not heave such dirt so as to injure your wall. This will also aid in preventing the frost from getting under the bottom layers.

When your wall is completed in this manner, bank it up well on each side, and you will have a wall that will stand for a lifetime.



PART VI.

• Live Stock; •

Hints and Directions for Butter Making, Etc.



FAT CATTLE IN THE SOUTH.

FROM what has been said herein in regard to grasses and forage plants, which furnish a plentiful supply of excellent pasturage and fodder, it will be readily seen that the South is a favored land for stock raising.

But in addition to these advantages other features should be noticed, such as the abundant supplies of fine stock water, the long, genial summers and correspondingly short and mild winters.

There is another great advantage enjoyed here in the eminently cheap and yet exceedingly valuable food found in cotton seed, cotton seed meal, and cotton seed hulls, both as daily rations in small quantities to young stock, and as fattening food in the place of corn to grown cattle.

After full trial it is found that a ration of 7 to 8 pounds of cotton seed meal with 20 to 24 pounds of cotton seed hulls, fed daily 100 days to 100 head of cattle, increased their weight on an average 4 pounds per day each. But this is not all; every farmer should know that a poor steer weighing but 800 pounds will only sell for about \$15 to \$16, while the same steer if well fattened up to 1,200 pounds will bring \$50. This results not only from the additional weight gained, but in the greatly improved quality of the entire beef. Cotton seed meal and hulls can be bought from any of the large cotton seed oil mills of the South, or will be furnished by any dealer in stock feed.

If the Southern farmer lives remote from any of our great cotton oil mills, and from railroad station, so that he cannot well supply himself with cotton seed meal and hulls cheaply, a ration of cotton seed, corn and corn cobs, ground up all together, will be found a very cheap and excellent food. But whether the cattle are fed with the commercial meal and hulls or with home ground cotton seed, corn and cobs, the stock should always have free access to plenty of pure water and of salt.

The farmer who lives remote from railroads would do well to provide himself with a good mill for grinding such foods as those spoken of. Such mills, costing from \$5 to \$100 each, according to size and grinding capacity, hand or horse power, can be bought of any good hardware or machinery dealer, in any large town.

Once a week, say on Sunday, the cattle should be fed hay or fodder only, or should be turned into a good pasture, thus keeping the bowels open and the stock in fine, healthy, growing condition. These are not matters of speculation,

there is no guesswork about it, but for the past six or seven years thousands of cattle have been fed in the yards near our great cotton seed oil mills with results above quoted.

DISEASES AND TREATMENT OF HORSES AND MULES.

HOW TO GIVE MEDICINE TO ANIMALS.

Those which are tasteless can be put in their feed; those which are soluble, in drinking water. If the medicine is of a purgative character do not repeat the dose until time (say twenty-four hours) has been given for it to act. Medicines given to relieve pain can, if found necessary, be given every hour; tonics and stimulants four to six times a day. It is well to taste yourself the preparations you give (great care being taken to let the portion be very small if the medicine is astringent or poisonous); a man should not give to an animal anything that he cannot take himself, in smaller quantity, into his own stomach.

In giving powders use a long handled kitchen spoon, drawing the tongue out with the left hand and placing the powder well back upon the roots of the tongue with the spoon. A little practice will make this quite easy. Another method of administering medicines is to form them into long pills or boluses, say $1\frac{1}{2}$ inches long, and 1 inch in diameter. These may be made by the incorporation of the drug with bran or meal wet up with molasses, mucilage or soap to make it stick together, the pill then being covered with soft paper. The tongue of the animal being then drawn out the bolus is slipped down the throat. An iron, called a bolling iron, or a plow clevis, is sometimes used to keep the mouth open. Sometimes large gelatine capsules are used, into which the medicine is put. These can usually be procured

from a druggist; but the paper covered bolus as above is generally found to be fully as good and convenient.

Injections: These are sometimes given by the rectum, and at other times given in small quantities with a small bulb syringe and a common pipe stem into the mouth.

Hypodermic injections: Such medicines as are perfectly soluble in water can often be given by injection under the skin, with a sharp pointed (hypodermic) syringe. Dissolve the medicine in pure water, fill the syringe, run its needle-like point under the skin at some loose place where the harness will not chafe it—just back of the foreleg is as good as any other place—and discharge the syringe. In this manner the medicine goes almost instantly into the circulation of the blood, and speedy relief from acute pain is often gained.

EPIZOOTIC, OR INFLUENZA.

This disease, sometimes also called pink eye, is of an epidemic character, sometimes spreading over a wide extent of country. The symptoms are fever with coughing, inflammation of the mucous membrane of the nose, redness of the eyes, hence the name of "pink eye." The animal becomes weak, and heavy discharges of phlegm come from the nose.

The treatment usually found to be efficacious is with warm, laxative food, such as bran mashes, in which a little bruised flax seed has been put. House the animal well, shutting off all cold draughts, give him a comfortable bedding of straw, and if he seems very weak administer tonics, such as whisky and quinine. The chief remedy, in our opinion, is a tincture of poke root (*phytolacca*) made from the root of the common poke berry. Dig the root, cut into small pieces, dry it in a pan in the oven (without burning it), when it is dry put

it into a bottle and turn enough whisky or alcohol, reduced one-third to one-half with water, on it. Dose for a full-grown horse a tablespoonful every two hours, given in water, until four doses have been given. This can be administered very easily with a long-handled kitchen spoon or by *drenching*, that is by putting it into a strong wine or beer bottle, the neck of which is put down the animal's throat, the horse's head having been elevated by passing his bridle reins over a beam in the ceiling of the stable. Do not turn all the liquid down at once, let it trickle down slowly so as not to choke him. Poke root is in every case of cold or epizootic the first remedy to use, it will often drive away the attack, drying up the discharge, if given in time.

COLT DISTEMPER.

This disease, which sometimes attacks young colts, is of a somewhat similar character to the foregoing, and should be treated similarly.

This trouble, however, is sometimes accompanied with swellings under the jaws which frequently burst and discharge large quantities of pus. If these swellings do not subside, but swell without bursting and are evidently painful, a poultice or blister should be applied, and when the swelling is ripe it should be opened, and the accumulated pus discharged.

The first remedy to use is the extract of poke root as recommended as above, a smaller quantity being given to a young colt than to an old horse. This remedy is excellent as a preventive, and if taken in time will often drive off the attack.

GLANDERS.

This is one of the most dangerous and contagious of diseases, not only to other animals but to man himself.

Characteristic symptoms are heavy discharges from one or both nostrils, of very fetid, offensive matter, and often the forming of small ulcers on the partition of the nose. There is no known remedy. Send for a veterinary surgeon, or have the animal killed at once, the carcass burned or buried deep, and well covered with abundance of quicklime. The stable, harness, and all other articles and things which the animal has used or come in contact with, should be thoroughly disinfected by the use of a strong hot solution of copperas water; by smoking over a brush fire, etc., and no horse should be allowed to come into the stable, even after it is thoroughly disinfected or fumigated, or to come into contact with any exposed articles for several months. Unless the disease is at once stamped out by these energetic measures, it is likely to spread through the entire community and hundreds of animals fall victims to it.

SPASMODIC, OR CRAMP COLIC.

This trouble is usually the effect of cold, but sometimes of errors or change in feeding, and the seat of it is in the bowels, rather than in the stomach as is the case in flatulent colic. The attack is sudden. The pain is not continuous, and the bloating or distention of the abdomen as in flatulent colic is wanting. These differences serve to distinguish it from other forms of colic. There are usually frequent passages from the bowels, of small volumes, sometimes accompanied with diarrhoea and attempts to urinate.

Treatment: Friction of the limbs and body is recommended, blanketing, keeping the animal in a warm place, injections of warm water by the rectum (about one gallon being used), injected carefully with a large syringe. If the

pain continues, give either of the following, as recommended by the Arkansas Experiment station:

- (1) Chloral Hydrate, 1 oz.
 Sulphate of Morphine, 4 gr.
 Water, 10 oz.
- (2) Oil of Turpentine, $\frac{1}{2}$ oz.
 Laudanum, $\frac{1}{2}$ oz.
 Raw Linseed Oil, 1 pt.

The South Carolina Experiment Station recommends the following:

- Fluid Extract Belladonna, 1 dr.
Fluid Extract Hyoscyamus, 2 dr.
Fluid Extract Cannabis Indica, 2 dr.
Fluid Extract Nux Vomica, 1 dr.

Add enough mucilage or raw linseed oil to make the whole 12 ounces, and give at one dose. If relief does not come, repeat the dose in an hour.

Sometimes intestinal worms present in large numbers, are the cause of colic symptoms. For this trouble give white ash bark burnt to ashes and made into a strong lye, mix $\frac{1}{2}$ pint of this with 1 pint warm water, and give all, two or three times daily; or, wormseed oil 1 oz., oil turpentine 4 dr., castor oil 3 oz., fluid extract spigelia 1 oz., hydrastin 20 gr., syrup of peppermint 1 oz. Dose two tablespoonfuls in four tablespoonfuls of water three times a day, before eating.

FLATULENT COLIC.

In this disease the rapid bloating of the abdomen is the characteristic symptom. It is caused, doubtless, by the indigestion and rapid fermentation of food, such as clover or

other green forage, or unseasoned hay or grain, a gas being formed in the larger intestinal canal, which, if not soon relieved, frequently causes death.

Massage of the abdomen and walking the animal about are recommended.

A chemical absorbent that will unite with the acid gas in the stomach and reduce its volume; or an alkali, such as soda, which will neutralize the acidity of the undigested food and prevent the gas from forming, will be found exceedingly useful. As a chemical absorbent, chloride of lime, to the amount of half an ounce, may be given; or as a mechanical absorbent, pulverized charcoal or air slacked lime in small quantities; quicklime will not answer, as it will burn like a fire in the stomach.

Frequent injections of soap and water, to which has been added an ounce of turpentine mixed with an equal amount of raw linseed oil, are recommended by some authorities.

If relief is not obtained, the temperature rises, the pulse is rapid, and breathing becomes laborious; no time should be lost, but the gas should be let out by puncturing the *right* flank with the trocar.

This should be performed near the hip bone, directing the trocar downward and inward. This should give immediate relief. This cannot be done with a knife as in the case of bloat in cattle, but a trocar, which is a long, spear-like, three-cornered lance, should be used. A large knitting needle, with one of its points sharpened, might be used, but should be first well washed in diluted carbolic acid or bichloride of mercury, or not having these, the instrument, whatever it may be, should be well cleaned by rubbing with earth

or sand, and well rinsed with boiling water, to prevent blood poisoning.

The South Carolina Agricultural Experiment Station, in its Bulletin No. 22, speaking of the use of the trocar in cases of flatulent colic, says: "The trocar should be inserted in the upper third of the flank, on the right side at a point equally distant from the transverse process of the lumbar vertebrae, hip bone, and point of last rib. The trocar and cannula are held firmly in the hand, put upon the described spot, and with one quick, sharp blow driven into the inside in a downward and inward direction. The trocar is then withdrawn, and the gas will as a rule leave by the cannula. Before introducing the instrument into the body, it must be made clean by allowing it to remain a few minutes in a 5 per cent solution of carbolic acid, or by boiling it a few minutes. The spot on the animal to be punctured should be thoroughly scrubbed with soap and water and rinsed off with the carbolic acid solution. The cleaning of the instruments and the parts to be punctured is quite necessary, and should never be omitted, if good results are expected."

This disease is one of the most frequent and fatal to horses, and calls for constant watchfulness on the part of the owner in the changing of food rations from dry to green fodder.

HEAVES.

This disease is not very common at the South, but cases sometimes occur.

Symptoms:—Labored breathing when exercised, the flanks *heave*, hence the name. It is usually worse on damp, rainy days than on others. Feeding dusty hay makes it worse. It is caused undoubtedly by the closing of part of

the air cells of the lungs by inflammation, and the animal has to labor harder to get a sufficient amount of breath.

Arsenic in 5 grain doses is recommended as beneficial, but the disease is said to be chronic and incurable, and money spent for cures is probably thrown away.

SPAVIN AND RING BONE.

This is a disease of the hock joint. It is similar to ring bone. The lameness is usually acute for the first few steps but grows less as the animal is exercised. When started after a second rest the lameness is as acute as before. The animal usually drags the foot and wears off the toe of the shoe in traveling. Sometimes lumpy, callous bunches are formed upon the hock bone, but in other cases they do not occur.

Treatment.—Turn the animal out to pasture for two months. If lameness continues it should be "fired and blistered." This treatment should only be attempted by a veterinary surgeon.

Ring-bone is a similar deposit of bony material around the pastern. There is usually inflammation and lameness preceding the enlargement of the bone. The treatment is exactly the same as for spavin.

STIFLE.

This is a dislocation of the stifle joint. It is common in some young horses.

Symptoms.—The animal drags the hind leg, being unable to bring it forward.

Treatment.—Put a rope around the fetlock, bring it forward around the neck and draw the leg forward, pressing inward toward the flank at the same time on the stifle bone, when it will slip into place with a jerk. The same trouble

sometimes occurs with cattle, and should be treated in the same manner.

FOUNDER.

This is a disease of the membranes of the foot, that secrete the hoofs. The forefeet are usually affected. It is said to be caused by eating too freely of highly stimulating food, by overwork, sudden chills when overheated, or by long journeys under saddle beyond the strength and endurance of the animal.

Symptoms.—The horse stands with the forelegs extended forward and the hindlegs drawn under the body. This is accompanied by rapid pulse, high fever, dilated nostrils and painful expression of the eye. The animal is disinclined to move, and when compelled to do so, seems to suffer great pain.

Treatment.—Apply poultices to the feet and legs, putting dry cloths over the damp ones, or stand the horse in ice water or a mud hole half a day. Then throw him, or compel him to lie down, and take off his shoes while in this position, as this cannot be done while he is standing, the pain being too great for him to stand on one foot while the shoe is removed from the other. These cases generally recover but often the legs, especially the hoofs, are deformed afterwards, permanently.

LOCK-JAW.

This is usually caused by a wound such as that made by a nail in the foot, or may follow castration, etc.

Symptoms—The muscles of the jaw are rigid so that the teeth are locked tightly together; the neck is arched, tail raised, eyes sunken and sometimes the inner lid covers the eyeball.

Treatment.—This is very simple. The animal should be put in a dark, loose box or stall, with hay and water in the manger and left alone. No one should go near him, make any noise or bother him in any way. No stranger should go near him and the person who is in the habit of taking care of him should only visit him to give feed and water. Of course before this is done the cause of the trouble should be sought for, and if the nail or other foreign matter is still in the foot, it should be removed, the wound washed with carbolic solution, and care taken to give outlet to pus, or suppurative matter, that may form.

HORSE OINTMENT.

Rosin, 4 ounces; beeswax, 4 ounces; lard, 8 ounces; honey, 2 ounces. Melt these slowly together, bringing them gently to a boil, then remove from the fire and add a little less than a pint of spirits of turpentine, stirring all the time while this is being added.

This will be found to be an excellent ointment for all bruises of the flesh or hoofs, for saddle or harness galls, cracked heels, or any cuts or sores of man or beast; it will also be found excellent to apply to burns or scalds to take the fire out. It would be well for the farmer to keep a supply of this ointment ready for use at all times, keeping that to be used by the family in a different vessel and place from that to be used for stock.

LINIMENT.

Oil of spike, oil of turpentine and ammonia water, of each 2 ounces; sweet oil and oil of amber, of each $1\frac{1}{2}$ ounces; oil of origanum 1 ounce. Mix.

This will be found excellent for lameness, inflammations, and for all cases in which a liniment is desired.

TO BREAK COLTS.

Every colt should have a little halter made for it, and slipped on, even before the colt is weaned. Take it off and put it on several times a day. At first it should have no hitching strap to it, then add a strap and tie it to the bridle of the mother. In a few weeks change the halter to a small bridle, with bit and all complete, keeping this on but a short time at first, at the same time putting a small surcingle around his body, then in a few days strap on a blanket, and at last put on a small saddle, treating the little fellow with perfect kindness and gentleness at all times, and as soon as he begins to feed, give him, as a reward for good conduct or to induce quiet behavior, a piece of sugar, apple or a little bran or meal, anything of which you find he is fond, and by the time the horse is two years old he will be broken to saddle, and by similarly getting him used to buggy shafts and hitching alongside of his mother when driving her, you will find you have him well broken both to saddle and harness.

"Be kind to your horses" says a writer in the *Ohio Cultivator*, and proceeds to argue the wherefore in this sensible wise: "In the course of my life I have seen a good many horses, some, too, that were called ugly horses. Now, it is my opinion that there is no use owning what might be called an ugly horse. Use the whip and spur less, and in their place put kindness. Three grains of kindness are worth all the whips and spurs in the world in breaking a colt. There are a great many horses injured for want of kindness. This I am sure no one will pretend to deny. The colt has never been handled. The man, with several others to help him, drives the colt into the stable. He then forces a bit into his mouth, and if there is one among them that dares, he jumps

upon his back, well armed with a stout whip, and very often a spur; these he does not forget to use. He clings to the colt's back as long as he is able, but is finally thrown off. He tries again and again, until, completely exhausted, the colt is obliged to yield, that is for the time being. Is this the way to break colts? No, to be sure it is not. The golden rule will apply here as well as anywhere. So be kind to your horses, my gentle friends."

WHEN TO WATER HORSES.

From the *American Agriculturist*.

Always water your horses the first thing in the morning, and do not let the water be too cold. If it is too cold you will probably have a case of colic. Water is best when it is about 10 degrees warmer than the outside air in winter, and as much cooler in summer. Give the hay before the grain so that the stomach may be partially filled before the concentrated food gets into it. Better still, feed chopped feed. Mix the ground grain with dampened hay or fodder, and give the largest feed at night when the horse has time to digest it. Fat and food for the muscles are made when the horse is at rest.

HOW TO CURE A BALKY HORSE.

In the first place, my friends, please remember that you cannot cure a horse of this habit by whipping him. Every blow you strike will only make him worse; not because the horse is obstinate, but because he is so constituted that when he once balks, a hypnotic condition comes upon him whenever like circumstances occur, which makes it impossible for him to exert his will power, and so he stands like one in a trance, unable to move.

It has often been said that the mind of a horse cannot hold more than one idea at a time, and our observation leads us to believe this true.

But we think we hear you say, "Hurry up and tell us how to cure a horse of balking."

We will tell you how we cured ours. He would balk and then back. We cured him by providing a small supply, a few handfuls, of grass in our buggy, and just as soon as he balked, gave him a mouthful of it, and taking him gently by the bit, led him forward a few steps, then gave him another mouthful, got into the buggy and drove on. We always treated the horse kindly, never touched him with the whip when he balked, and in a week or ten days had him entirely cured; and as this was about three years ago and we own the horse still, and he has never shown the least disposition to balk since, we can safely say he is permanently cured.

We have heard that to tie a small cord around a balky horse's ear, and twitch this when he balks, will make him go; also, that a similar cord tied around the roots of his tail, carried forward under his belly and brought up over his shoulder and so back to the driver's hand, would, if pulled in short jerks, make a balky horse forget to balk and start forward. We have no confidence in these methods, but recommend highly the grass treatment, coupled with kindness and quiet, gentle handling.

In the winter time, if you have no grass, substitute good sweet hay or fodder, an apple, or other food of which the horse is fond, for the grass.

STABLES.

At the South, where our winters are comparatively mild, a common fault is to build stables altogether too open, the custom being to construct them of logs, not filling the cracks in any way, so that cold draughts of air find their way in on all sides. We have so many warm days and cold nights that the change of temperature in twelve hours is often very great, and stock often suffer exceedingly. The difference in appearance between the coats of horses kept in livery stables and other comfortable quarters, and those of ordinary farmers' horses, speaks loudly of the value of the housing of the former; and the difference is not in appearance only, but also in liveliness and endurance. The well-housed horse has largely the advantage.

It is well to have sufficient ventilation in the top of the barn so that the air may be pure, but do not let cold winds blow in at night upon the body of the horse from openings in the stables, and especially do not leave a window open at his head, as, if the wind should blow strong from that direction during the night, the probable result will be a heavy cold on the lungs or epizootic disease that will greatly weaken the horse.

CONSTRUCTION OF STABLES.

When about to construct a stable, select, if possible, a dry position; or, at least, one in which a system of draining can be put in operation. Another point is to obtain a sheltered location—one where the north winds will not have full play upon it. A southern front (especially if sheds for cattle extend so as to form, with the barn, the three sides of a square) is preferable to any other.

Damp stables are as prolific of disease as damp houses. Speaking in reference to this the *Stable Book* says, "here it is we expect to find horses with bad eyes, coughs, greasy heels, swelled legs, mange, and a long, rough, dry, staring coat, which no grooming can cure. The French attribute glanders and farcy to a damp atmosphere; and in a damp situation we find these diseases most prevalent. In London there are several stables under the surface; they are never dry, and never healthy. The bad condition, and the disease so common and so constantly among their ill-fated inhabitants, may arise from a combination of causes; but there is every reason to believe that humidity is not the least potent."

When horses are first lodged in a damp stable they soon show how much the change affects them. They become dull, languid, feeble; the coat stares; they refuse to feed; at fast work (through weakness) they cut their legs in spite of all care to prevent them. Some horses thus placed catch colds, become exceedingly liable to such contagious diseases as influenza, etc., and from frequent visitation of this nature the lungs become weakened, and consumption ends the scene.

We can hardly say that the majority of our Southern stables are so constructed as to exclude the air—the reverse of this is generally the case, especially in severe weather—but very few of them are so arranged as to obtain *perfect ventilation*. If closely built, as they ought to be for comfort, and windows inserted where we now have *holes*, then the air would be exceedingly impure and we should soon witness the workings of this evil. Pneumonia is the offspring of illy ventilated stables. Dadd, in the *Modern Horse Doctor*, says:

"The hot, moist atmosphere, which is to be found in the majority of unventilated stables, prevents the insensible

perspiration from being evaporated with that rapidity so necessary for the purification of the system. The atmosphere may be said to be saturated with moisture, so that the excrementitious materials thrown out from the external surface, instead of finding a ready outlet in space, where they would be soon decomposed and again made fit for respiratory uses, are condensed on the surface, and re-absorbed in their defiling state. It has been discovered by a number of experiments, that when warm-blooded animals are placed in a hot atmosphere, saturated with moisture, the temperature of their bodies is gradually raised 12 degrees or 13 degrees above the natural standard, and that the consequence is then inevitably fatal. Let it be understood, then, that no evaporation from the skin can take place when the stable atmosphere is saturated with vapor, and also that if this be the case, the heat of the body increases, rather than decreases—a condition which places our patient beyond the reach of the veterinary art."

Having secured a favorable location, a two-story building will be found best, as hay and fodder can then be stored above and fed down into the mangers conveniently. Stairs or steps should be built, that ready access may be had into the loft, so that your clothing need not be torn and worn out, and time wasted, by climbing hand over hand up a slat ladder to get at the feed. Build your stable comfortable *for yourself*, as well as for your horses. Time spent in securing all the conveniences possible is economically employed, in view of the saving of time they give all through the many years you will have the use of them. A roomy, loose box stable for each animal is of course preferable; the size should be not less than 10 feet square; but if you feel obliged to economize in space and material, especially if you wish to

stable a number of horses, stalls may be made 5 or 6 feet wide by 12 feet deep, having partitions dividing them from those adjoining, running up 6 feet high at the head end and sloping down to about 4 feet at the back, which should be 9 feet from the front, thus leaving an alleyway 3 feet wide, behind the horse. Such stalls should always be floored, and the floors a little inclined toward the back, to facilitate the running off of urine. If not floored the continued voidance of water in one spot creates an ill smelling mudpuddle under the horse, which is very hard to keep clean. Loose boxes may be floored or not, as you choose, but stalls should always be floored. Back of each stall should be a slide door in the outside wall 12 or 15 inches square, out of which the manure can be thrown every morning. This however, should not be left where it is thrown, but removed in a wheelbarrow to an adjacent shed, where it can be stored in a pile guarded from the rain, which if allowed to fall upon it, will cause it to rapidly deteriorate by leaching and fire-fang.

TO KILL LICE ON FARM STOCK.

When any stock is infested with lice, whether horses, cattle, sheep, or hogs, give copperas in their food every other day, for six or eight days—say a half a teaspoonful to a sheep. If the above directions are followed, the prescription will kill the vermin inside and out, leaving your cattle with a clean stomach and a healthy skin.

HOW TO MAKE COWS EASY MILKERS.

Some cows are very hard to milk, the lower milk ducts being closed, or nearly so; sometimes by the growth of ligaments in the teats. To remedy this, have a blacksmith draw you out a small steel lancet, say 6 inches long, so you can

handle it well—5 inches of the length may be round, say like a rat tail file, the other inch let him hammer down thin, about an eighth of an inch wide, and as thick as a dime. Now grind it to a double edge and a sharp point, and whet it smooth and keen.

If your cow is wild, cast her and insert the lance its full length (1 inch). It is not a very painful operation to the cow, and although the milk will be bloody two or three times, the wound will very soon heal, the milk flow freely, and your cow become as easy a milker as any other.

Before using the lance it should be thoroughly washed in a 5 per cent solution of carbolic acid, or well scoured with dry earth and afterwards well rinsed with *boiling* water, and after being washed the blade should not be handled before being used, or blood poisoning may result to the animal. This same precaution should always be taken in the use of any surgical instrument; both before and after the operation, it should be put through a thorough cleansing process.

SALTING CATTLE.

"Should cows or any other cattle have salt given them oftener than once a week? Should they have all they will eat?"

That cattle have a natural appetite for saline matter is evident from the distance traveled by the deer, buffalo and other wild animals to visit their "licks," or places where salt or brackish water may be licked up. Salt is supposed to be essential, mixed with the food of man or animals, as an aid to digestion. Of the quantity necessary, animals themselves are unquestionably the best judges. If given at intervals of one or two weeks, as is too often the case, so

much is eaten as to act as a cathartic, which, with the water needed to quench the unusual thirst, produces scouring. When obtainable, rock salt in large blocks is preferable; but where this is not to had, common salt may be placed in a box (after being wet and then dried, thus making it hard) at convenient points under cover, and cattle, horses and sheep will help themselves without danger of taking too much.

CARE OF YOUNG PIGS.

The following is from a paper prepared by Chas. E. Barker and read at the meeting of the Kentucky Swine Breeders' Association at Louisville:

The care of young pigs is the most important part of swine breeding, and unless the pig is properly managed the hog will never attain its best result. The first important step in this matter is a gentle sow; second, a clean, warm bed, entirely free of dust (the pig's worst enemy), in a place where the sow can be quiet and not annoyed by other hogs; third, feed for sow that will make the desired quantity (no more) of wholesome milk for the pigs, and fourth, plenty of well prepared food for pigs, and with a lot where the sunshine and pure air and plenty of exercise will keep them in good health. I will say nothing about the breeding and previous treatment of the sow, though this is inseparably united with successful pig raising, for unless the sow is carefully bred and well provided for, previous to farrowing, the result will be disappointing. She must be gentle for reasons too obvious to mention here, one being sufficient. Should she need any help you could render it. She should be put in her lot and become accustomed to her quarters ten days or two weeks before farrowing. Her bed should be plenty

large, or roomy, dry, clean and warm. She should be as much by herself as possible so as not to be excited by any other stock at this time. Watch for the farrowing, but do not offer any assistance unless positively demanded—she will be best alone 99 out of 100 times. Only once in fifteen years have I had occasion to render help, and now doubt that that was needed. When the pigs are born see that they all get to the teats, and let the whole business alone for twenty-five hours, only see that the afterbirth is not in the way of the pigs and to remove it with a pitchfork if the dam does not eat it in an hour or so. The lot should have plenty of good drinking water, as the feverish dam will be thirsty. The sow will indicate at the end of twenty-four or thirty-six hours that she needs something to eat, and should be given a thin slop of warm bran or chopped wheat. Never give her all she wants. Don't encourage her to eat; over-feeding the sow at this time is sure to produce a crop of culs. Never let her have as much as she wants until the pigs commence to eat slop, and then never leave any in her lot. Try at all times to keep the sow just as quiet as possible; be on speaking terms with her, scratch her and the pigs and make them gentle, and you will find it a great pleasure, as well as profit, to look after them every day. I am sure we can not do better for two or three days after the birth of the pigs than to secure the greatest quiet and comfort for the sow and try and give only such attention as is positively required. I have known the squealing of a pig to arouse hogs in adjoining lot, and they would excite the sow, who would tramp on her pigs and do much damage. Keep her quiet by all means. When she comes out and wants exercise, have the warm slop (of ground

wheat and bran made very thin) ready, and let her have a little of it. Don't feed her in the bed nor too near it. Remember, a sow overfed will surely overlay her pigs, as she is too dull and sluggish to properly notice them. Gradually make the slop as thick as pigs can stand it. I am aware I am saying a good deal about the care of the sow, but this is the only way to care for young pigs. Just so long as the sow is properly cared for, just so long and no longer will the pigs be cared for. If the sow is overfed the pigs will suffer the consequence; just here is the critical point. If you will manage the sow properly for two weeks after the birth of the pigs, the fight is half won, and the only way I can do it is by close personal attention to the sow. My friends, if you don't intend to do this, you had better stop and try something else, for you have missed your calling and your plan will not go. Feed the sow three times per day, or whenever she is up; don't arouse her to feed. Feed on not too rich food. Watch closely the pigs, for if the feed scours the pigs you have a bad job on hand and some culls. Change feed at once. Feed dry bran or wheat; a little skimmed sweet milk to the sow is good, also a little charcoal and copperas put in the feed once per week all the year round is a fine preventive of disease--worth all the cholera cures in America. After the pigs commence to eat slop, have a pen where the sow can't get to the slop, and feed the pigs a little slop or skimmed sweet milk warm. Gradually thicken it with shorts or ground wheat, keeping the pigs a little hungry all the time, and remembering that a hungry pig is much more desirable than one overfed. I only use corn or cornmeal for pigs after they are two or three months old, and then only in cold weather. Corn makes fat and heat, but is too consti-

pating, while wheat, bran and shorts make bone and muscle, and are more laxative. I have almost come to the conclusion that corn newly made into a slop is a poor hog feed. Plenty of sunshine and exercise is also needed and must be had.

PLENTY OF GOOD DRINKING WATER FOR HOGS.

It will be noticed that in the beginning of the foregoing article Mr. Barker speaks of dust as "the pigs' worst enemy," and several swine breeders in this State have told us they have found that when their hogs were kept and pastured in a low wet lot, where there was abundance of water, they were perfectly healthy; but when removed to a field in dry stubble, or where the ground was dry and dusty, and the water supply was not as good, many died. It seems to be a fact that where a hog roots in dry, dusty soil and gets his nose and lungs filled with dust, and cannot readily get to water, he dies.

It may be that many cases of so-called "hog cholera," or deaths from unknown causes, are the result of want of care in this respect. It would be well to see to it that in turning hogs on to stubble fields, or giving them the range of a patch from which corn, potatoes, etc., have been harvested, the ground be not too dry and dusty, and that they have ready access to a plentiful supply of good water.

COTTON SEED AND COTTON SEED MEAL FATAL TO PIGS.

A test was made at the North Carolina Experiment Station, of feeding pigs rations, containing as one of their constituents cotton seed meal as contrasted with the feeding of other compound rations, in which corn meal was substituted for the cotton seed meal, the other constituents being

in each case the same. The result is summed up in the station bulletin as follows:

"As the result of feeding cotton seed meal it may be stated that 4 ounces were fed per day with 32 ounces of wheat bran for twenty days, and 20 ounces of cotton seed meal with 40 ounces of wheat bran for the following twenty-one days, were fed and nearly all consumed by a healthy pig, without faltering; but when 2 pounds per day were fed, the pig refused to eat so much, and became sick on what was eaten, but recovered on a corn diet. This seemed to emphasize that cotton seed and cotton seed meal is an unsafe food for swine."

During the first period (of twenty days) $12\frac{1}{2}$ pounds of separated milk and some green feed were given each day to each pig, and during the second period (twenty-one days) milk was not given, but a daily supply of green weeds and earth pulled up with the weeds, was fed.

The Texas Experiment Station in its Bulletin No. 21, under the heading "EFFECT OF COTTON SEED AND COTTON SEED MEAL IN FEEDING HOGS," gives the following:

RESULT OF FEEDING COTTON SEED MEAL TO PIGS.

Foods.	1891.		1892.	
	Fed.	Died.	Fed.	Died.
Raw cotton seed soaked	0	0	3	2
Roasted cotton seed	5	4	3	2
Boiled cotton seed.....	5	1	3	1
Cotton seed meal.....	5	5	3	2
Corn only	5	0	3	0

This shows the death of ten out of fifteen pigs fed on cotton seed and cotton seed meal in one year's experiments, and seven out of twelve the next year.

The bulletin goes on to say: "In corroboration of the above results for two years in succession, we have to state further that several times during the past decade the college herd of swine has suffered from attacks of apparently epidemic disease—cause not then understood—the symptoms, both before and after death, agreeing closely with the symptoms noted carefully in later tests. Since the later tests have warned us of possible cause, we have definitely determined that in case of each and every outbreak in the college herd of swine—three separate times—sickness occurred within a period of ten weeks after the first addition daily of a very small quantity of cotton seed meal (not cotton seed) to the slop on which the hogs were fed. As above stated, the symptoms are remarkably uniform, and once seen, an intelligent observer will hardly fail to recognize a recurrence of the trouble.

"The first sign of sickness, appearing in from six to eight weeks after cotton seed meal is added to the ration, is a moping dullness of the animal with a loss of appetite and tendency to lie apart. Within the course of twelve to thirty-six hours, often within a shorter time, the animal becomes restless, staggering in his gait, breathing labored and spasmodic, bare skin showing reddish inflammation, sight defective, and both the nervous and muscular systems feeble and abnormal in action. The fatal cases all show spasmodic breathing, and in many instances the animal will turn in one direction only—following a fence or building wall so closely as to strike his nose against projections in a vain endeavor to

push outward in that one direction which he tries to take. If no fence or building intercept him, he may travel in a circle, large or small, according to the mildness or acuteness of the malady in his particular case. When exhausted in his efforts, the animal drops down suddenly, sometimes flat upon the belly, sometimes dropping on his haunches with his forelegs well apart to keep from falling over, almost always with the evidence of more or less acute internal pain. At death a quantity of bloody foam exudes from mouth and nostrils."

The teaching of these tests and observations is, that cotton seed or meal, in any known form, is poisonous to swine, and however fattening and heathful to cattle, should never be fed to hogs.

GESTATION.

By this term is meant the duration of pregnancy; the time an animal carries its young in the womb, from the date of intercourse to time of delivery.

Mares—Period varies from 340 to 350 days. Some time, cases occur in which the term is as short as 325 days, and sometimes as long as 365 days.

Cows—Period 280 to 285 days. They also vary in times twenty days earlier or later.

Sows—Period 112 days, with but little variation.

Sheep—Period 147 days. Some breeds, however, vary slightly from this time, more or less.

BUTTER MAKING AT THE SOUTH.

An erroneous idea has prevailed in the North in regard to butter making in the Southern States; the majority of people there having a settled opinion that good butter cannot be produced here, that this and all our other supplies of

dairy products excepting fresh milk must be imported from the North.

Now while it is true that great quantities of butter and cheese are imported every year, we most strenuously insist there is no good reason why this should be done, for wherever practical or scientific butter or cheese making is tried, whether by individuals or in creameries and cheese factories, in any part of the South, from the Ohio River down to the Gulf of Mexico, these articles are made of most excellent quality and flavor, and keep as well as any from the North.

It is true there is an almost unlimited market for such products here, and not one-thousandth part as much is made in the South as should be. Wherever factories of these goods have been started in good locations, and under proper conditions and management, they have prospered, finding a ready and remunerative market for all their products, but we cannot say they have turned out as good goods in all cases as they might have done. There are several reasons for this:

First. Pasturage and fodder of cultivated grasses and clovers have not in many cases been provided, as they might so easily have been.

Second. Improved breeds of milking stock, such as the Jersey, Holsteins, Devons, etc., although there are some good herds in the South, have not yet been largely introduced.

Third. Cotton seed meal and hulls or seed, being great milk-producing foods, and very cheap at the South, have been largely fed in the vicinity of our creameries, and it is a well-proven fact that the finest butter cannot be produced when these articles are made a principal ration. They are excellent fattening foods, and should be fed to cattle intended

for beef, or they may well be given to cows furnishing milk to be sold out by the quart, by the city milk peddler; but if fed at all to cows whose milk is to be churned, they should only be given in small quantities, with plenty of sweet, green or dry grasses or fodders as the main foods. The effect of heavy feeding of cotton seed products, is to make the butter white and give it a sort of wooly texture not acceptable to most palates, and largely wanting in the sweet, delicious taste which good butter should have.

There is not found to be any climatic trouble here to interfere with the making or keeping of good butter, for it is now well known that our summer days are not so hot as those experienced in the very heart of the best butter-making districts of New York, Ohio or Illinois; and we have no hot nights, such as are frequently experienced there. Certainly our summers last longer, but with our seasonable rains, this only gives us a longer time for good pasturage and healthful out of door life for our cattle; and butter keeps here with the same care as is given it North; fully as well as there, in summer or winter.

Then the question of plenty of cheap ice is now solved by the manufacture of this commodity; while the great multitudes of cool springs, and the certainty of finding ample supplies of excellent cold water in open, bored, or artesian wells at the South, make good butter making a certainty, other things being equal.

All over the South the old housewives have their thousands of roofed spring houses, where cool, sweet water flows around their milk pans and cream jars.

Then again, the same breed of cows, fed with like food, will give as much and as rich milk, and will have as good if

not better health as at the North, and surely will be as profitable, when pastured on our lands worth from \$5 to \$25, as upon those North worth from \$50 to \$100 per acre.

The following extract from a published letter from I. M. Tuller, manager of the Grand Prairie Creameries, near Stuttgart, Ark., will illustrate what is, and what can be done in butter making at the South.

"In response to your request for a statement of the business done by our Grand Prairie Creameries the past year —1895—will say that we handled 2,330,373 pounds of milk, or 279,645 gallons. This would have required a line of wagons and teams $6\frac{1}{2}$ miles long, each wagon carrying a ton, or 240 gallons. The product was 114,688 pounds of butter, or five and three-fourths carloads, which sold for \$20,498.80 net. Of this amount \$14,275.74 was paid to farmers for milk, about \$1,600 for labor, \$600 on the Stuttgart creamery debt, \$435 for additional machinery in the Carlisle factory, and the balance, \$3,588.09, in operating expenses, which includes taxes, repairs on buildings and dividends to stockholders.

"Prices for butter last year were the lowest in the history of our creameries. But this was the case in all the dairy producing sections over the world, as well as a depression in nearly all farm products. In spite of it, however, our patrons have prospered. Add to their \$14,000 income for milk, the sales from their hogs and calves—at least \$10,000 more, and with the increase in value of their land, they are freer from debt, have more cash at command, better houses and barns, and more contented, as a rule, than any other class of farmers in the country.

"One of our best dairymen said to me a few days ago: 'I like the creamery better and better. No butter making at home, just take my milk to the factory, and once a month get spot cash for it, and generally more than I expect. Count on me to stay with the creamery.'

"Prospects for 1896 are encouraging, as business is reviving in a general way everywhere. I am getting Elgin prices, 23 to 24 cents for butter, from 1 to 2 cents more than last year this time. Demand and collections are better, and with lower cold storage rates for our surplus spring and early summer butter, am confident that we can pay considerably better prices for milk this year."

There is still at the South and will be for many years to come, splendid opportunities for investment and money making in butter and cheese production; the long freight haul giving the Southern producer a great leverage of profit in this item alone.

In regard to the relative profit in dairying as compared with other farming, the following from Bulletin No. 19, of the South Carolina Experiment Station, prepared by J. W. Hart, Esq., of the college faculty, is pertinent:

"If a ton of cotton seed be sold off the farm it removes as much fertility as would have been taken off by 25 tons of butter worth \$400 a ton. The purchase of 1 ton of cotton seed meal will bring back to the farm as much valuable material for plant growth as will have been carried off by the sale of forty live hogs, weighing 200 pounds each."

We highly recommend to those about to engage in butter or cheese making at the South, that they obtain a copy of the valuable bulletin referred to above, which is full of valuable information in regard to suitable breeds, and the

best foods and methods to be used in producing butter and cheese in the Southern States.

TO KEEP BUTTER HARD AND COOL.

A writer in the *Scientific American* recommends to the ladies a very simple arrangement for keeping butter nice and cool in the hottest weather. Procure a large *new* flower pot of the common *unglazed* earthenware kind of sufficient size to cover the butter plate, and also a saucer large enough for the flower pot to rest in upside down; place in the saucer three or four even sized pebbles, say of an inch in diameter, and upon these put the plate of butter; now fill the saucer with water, and turn the flower pot over the butter, so that its edge will be below the water. The hole in the flower pot must be fitted with a cork; the butter will then be in what we may call an air-tight chamber. Let the whole of the outside of the flower pot be then thoroughly drenched with water, and place it in as cool a place as you can. If this be done over night, the butter will be as "firm as a rock" at breakfast time; or, if placed there in the morning, the butter will be quite hard for use at tea hour. The reason of this is, that when water evaporates it produces cold; the porous pot draws up the water, which in warm weather quickly evaporates from the sides, and thus cools it; and as no warm air can now get at the butter, it becomes firm and cool in the hottest day.

POULTRY RAISING.

It is a well known fact that young broiling chickens can be had at the South in any month of the year, *with proper care and preparation.*

With our short, mild winters many of our farmers take it for granted nothing need be done, fowls will take care of

themselves, irregular feeding or no feeding at all; merely letting the birds pick up their own living around the barn and in the fields, with perhaps a few ears of corn when somebody happens to think of it, is all that is necessary, eggs will be produced plentifully and the fowls will get along somehow through the winter.

It is a noticeable fact, however, that with such treatment as this, letting the chickens get such a living as they may be able to do, and roosting in any convenient or inconvenient tree or shed they may find, very few eggs are produced in the winter months, the very time when eggs are most in demand and bear the highest price.

Now that farmers have been driven by the low price of cotton to find some other paying crop, and the corn yield of the South has been doubled, furnishing ample food reserve for all kinds of live stock, the laying hen and the setting hen are factors that should not be overlooked.

The first point is to have comfortable quarters for the fowls winter and summer, dry days and wet days, and good sheltered roosting places. To secure these, sheds must be built, not necessarily expensive ones, but they should be roomy and dry. The roof may be thatched with straw if you choose, and the sides covered with boards nailed up and down; and alongside of each roosting shed should be an open, roofed yard, *facing the south*, and inclosed with pickets or woven wire on the front, and boarded up on the back and the side opposite the roosting shed. Here on cold, raw, windy, rainy or snowy days the fowls will be protected, and can scratch and get the exercise they need.

An ample supply of clean drinking water must be provided, also plenty of sand, ashes, cinders or charcoal and lime.

But all these will not secure a regular supply of eggs if you go no further. One of the main questions is that of diet. Corn alone is not the best food; it is a fat producer and if you wish to fatten pullets or chickens for market, use corn freely, but corn will not conduce to the laying of eggs; *soft foods*, such as bran or corn meal, wet up with water, or *scalded* or *soaked* oats, wheat, barley or rye should be the standard foods if you wish eggs.

In connection with these a ration of ground bone should be given daily; as also a small amount of green red peppers twice a week, the small, more pungent variety being much better than the large bull nosed sort, for fowls. Refuse meat from butcher shops, or scraps from the kitchen cooked with a little ground red pepper and some bran or cornmeal, given to them quite warm at night, will be found of great advantage. Under this treatment the yield of eggs will certainly increase from only two or three eggs from twenty fowls to as many as ten to fifteen per day, regularly throughout the winter.

To provide ground bone, a bone mill or crusher must be bought; a small hand mill made for this purpose can be obtained of any of the leading seed or implement dealers. Mann's Bone Cutter, costing \$5 and upward, according to size, is probably as good as any.

Let us recapitulate, then: comfortable roosting places and a covered yard where the fowls can be protected in snowy or rainy days from the weather, soft, warm food, ground bone, red pepper, lime, ashes and plenty of pure water, and it is better to have that warm in cold weather, will not only conduce to the health of your chickens, but insure you an ample supply of eggs in the winter months. The extra expense incurred is small and the trouble well paid

for, the price of eggs often running up to 25 or 35 cents per dozen in cities and larger towns in December, just before the holidays.

If you design to keep a large number of chickens, it will be necessary to build several of the roosting houses and covered yards described above, and it will be economical to build them in a row so that the wall of each house will be the side of the adjoining yard.

In one corner of each yard, place an open box of dry ashes, in which the fowls may wallow and dust themselves, and an occasional going over of the perches with coal oil will be found helpful in keeping away lice. Give them also a little pulverized copperas, say a teaspoonful to twenty hens, in their food, every other day for six days (that is to say, three doses a day apart); copperas is only sulphate of iron (sulphur and iron), will not injure the fowls otherwise, and is an excellent lice destroyer.

TO KEEP EGGS FRESH FOR HOME USE.

Be sure to have the eggs fresh; put two or three dozen in a colander, pour boiling water over them, and as soon as they are dry, roll each one in a paper, as lemons are put up, and stand them on the small end. Keep them in a cool, dry place where they will not freeze, and although put away in midsummer, they will be found as fresh as newly laid ones all through the following winter.

TO TELL THE SEX OF EGGS.

Eggs that will produce males are wrinkled upon their smaller ends; those producing females are smooth.

EMBDEN AND OTHER GEESE.

The Embden or Bremen geese were first imported from Bremen in the year 1820, by Colonel Samuel Jacques, of Massachusetts. In 1826, James Sisson, of Rhode Island, hearing that a superior breed of geese was not uncommon in the North of Germany, and not knowing that they had been brought to this country, made another importation. They have been kept pure, and we have no hesitation in saying that for size, beauty, hardihood, quality of flesh, and desirable habits, the Bremen geese are the best of all the goose family. Beyond their great size, and the uniform clear white of their plumage, we are at a loss for any sign of a specific difference between these and the common goose. In figure they are alike, and the bill and legs are of the same brick-dust hue; the permanency of these advantages, however (that we have just alluded to), may justify our speaking of them as a sub-variety.

One of their great advantages is this, that all the feathers being perfectly white, their value, where many are kept, is far greater in the market than is ever the case with "mixed" feathers. In weight, too, these birds have great advantage over the common goose. All white poultry, again, are considered to "dress"—that is, to pluck, of a clearer and better appearance than colored birds.

As quality of flesh, combined with weight, is a main consideration, we wish to mention, regarding the former, that the flesh of the Bremen (Embden) goose is very different from that of any of our domestic varieties. It does not partake of that dry character which belongs to the other and more common kinds, but is as tender and juicy as the flesh of a wild fowl; besides, it shrinks less in the process of cook-

ing than that of any other fowl. Some of the keenest epicures have declared that the flesh of the Bremen (Embden) goose is equal, if not superior, to that of the Canvas-back duck. There is assuredly some comfort, not uncombined with ease, in carving a bird that weighs 17 pounds.

The quality of the flesh of the Embden geese is equal in flavor to the famous Toulouse of France. The Embden is the earliest layer, and frequently rears two broods in one season, the young ones proving as hardy as any other. The Embden goose has prominent blue eyes, is remarkably strong in the neck, and the feathers, from near the shoulder to the head, are far more curled than is generally seen in other birds.

The quiet, domestic character of the Embden geese causes them to lay on flesh rapidly; they never stray from their home, the nearest pond and field satisfying their wants, and much of their time is spent in a state of quiet repose.

When first hatched, the goslings are of a very delicate and tender constitution. The best plan is to let them remain in the box in which they are hatched for twenty-four hours after they leave the shell; but if the weather is fair and warm, may tolerate the letting the goslings out an hour or two in the middle of the day, when they may wet their little bills, and nibble at the grass. They ought not to be out in the rain at any time during the first month. A shallow pool dug in the yard, with a bucket or two of water thrown into it, to suit the temporary purpose of bathing, is sufficient during the period named.

The climate of the South is eminently favorable for the raising of all kinds of domestic fowls, chickens, ducks, turkeys and geese.

The latter do especially well here, and a great supply of water is not indispensable to their well-being. They are very cheaply raised, and can be turned out into a lane, pasture, or the highway every day, and will get their own living. Such care of the young goslings as is recommended above, however, is necessary at breeding time.





Part VII.

* Health Matters, *

Recipes, Tables, Etc.

A FEW REMARKS ABOUT HEALTH AT THE SOUTH.



THE healthfulness of this part of the country has been very much maligned and misrepresented. After extended travel in every part of the South, and a residence here of over twenty-five years, preceded by about the same time in different Northern States, the writer deems himself competent to judge and speak advisedly upon this subject.

For young children we doubt if there is anywhere a climate more healthful. A temperature scarcely ever ranging higher than 90 degrees in the hottest part of the summer, nor lower than zero on any day of the short winters, a climate equable and enjoyable, so much so that there are few days out of the entire year so inclement that a young, delicate child cannot play out of doors, or a mechanic or farmer work

in the open air, is certainly not an unhealthy one, unless certain other great drawbacks exist, which certainly is not the case.

The one great bugbear held up to frighten the man who thinks of emigrating South is malaria. It is useless to deny that there is some of this here, but so there is in New York, New Jersey, Michigan, Ohio, Indiana, Illinois, Iowa and Wisconsin, in places, but people go there and live there happily all the same, and so they can and do, all over the South. One can keep as free or freer from the effects of malaria living in most parts of the South, than they can from consumption in some parts of the North, and whenever an attack does come it is easily controlled and cured.

The fact is that life at the South is a joy and delight the whole year round, the records of the United States Signal Service showing, that the heat of summer is not so great as at the North, nor the cold of winter anything like as severe, while the health statistics of the United States army show that at the army posts in the South where troops have been stationed, the health rate is higher and the death rate lower than the average of other points in the Union.

ACCLIMATIZATION.

There is however, such a thing as becoming used, or acclimated to the climate, or perhaps we should say climates, of the South, for this country with its wide extent of territory has several distinct climates. There are also some precautions it is well to take here, especially during the summer months. The first we notice is that it is not well to sleep at night where strong draughts of air sweep over the bed. The nights at the South are almost always cool in summer, some-

times positively cold. They may not be so at sundown, but before morning the mercury drops 20 to 25 degrees as a breeze comes in from the Southwest or West. At 8 or 9 o'clock as the tired farmer goes to bed, the air is warm and summer-like, and he goes to sleep with all the windows and doors open, and scarcely any bed-clothing at all over him. The breeze from the Gulf region begins to blow about 10 o'clock, and from about 12 to 4 a. m. the cold increases until a chill has crept over the body of the sleeper, the pores are closed, malarial poisoning has begun. This is the time then to be guarded; the danger of disease is not so much in the daytime, as at night, at the South. See to it then that windows facing the direction from which the wind blows are closed. Provide extra cover to add to the bed-clothing. See that the children are covered well and comfortably. Do not be allured by the delightful fanning of the evening breeze and go to sleep with it blowing over you. It is better to shut the windows, and suffer a trifle from heat at first, than to have disease fastened upon you by your negligence.

We do not question but that the immunity of the negroes from disease at the South results from their cabins having tight shutters which are closed at night and keep out the night air, and the further fact that their sleeping rooms having fireplaces where the cooking is done during the day and a little fire kept all night, the temperature is kept at a more even point.

Perhaps the writer may be thought to be a crank upon this subject, yet he would stoutly maintain from his own experience, that to exposure to night air in bed, and to the fact of the rapid lowering of temperature after dark, the ailments that are charged to the Southern climate are due, and they

can readily be avoided by close attention to the precautions we have suggested.

Speaking generally, all kinds of diseases at the South are of a mild type and few ever attain an epidemic character. Fevers are light, usually yielding readily to medicine, and are rarely fatal; diphtheria and scarlatina are rare and not the dreaded scourges they are at the North. There are sometimes cases of pneumonia and pleurisy, but not as many or as severe as in other parts of the country. These points are strongly substantiated by the testimony of our leading physicians. The fact is, that for healthfulness, the South averages well with any other part of the United States.

CHILLS AND FEVER.

Remedy No. 1.—The thing to do with this disease, is always to take it in time, never to let it get fastened upon you.

As soon as the first chill appears, or the first symptom of one, such as pains shooting through the head, or a "shaky" or dull feeling in it, or pains in the back or loins, with a general tired feeling, take 2 grains of quinine when you have *no fever*, and repeat this at intervals of two hours, until from 12 to 24 grains have been taken. If fever rises, stop taking the quinine until the fever is entirely gone. At night take one-third to one-half teaspoonful of tincture of May-apple root (*Podophyllum peltatum*), which will act upon the liver similarly to calomel, but without its dangerous effects. If this does not cause a gentle action of the bowels, repeat the dose; it is drastic and griping if taken in large quantities.

As is well known, chills and fever is a periodical disease, usually recurring on each seventh day after the first chill. It

is well, therefore, to take a few doses of quinine and a little of the extract of May-apple on the day in each case preceding the "chill day." This may not be absolutely necessary, but it is well to be on the safe side. The thing to do is to break up the disease thoroughly just as soon as it appears.

FOR A VERY BAD CASE.

Recipe 2—For a stubborn case of fever and ague, which other remedies have failed to cure, the following is recommended: Quinine 20 grains, Dover's powders 10 grains, subcarbonate of iron 10 grains. Mix with mucilage of gum arabic and make into twenty pills. Dose two each hour, commencing five hours before the chill is due. Then take one each night and morning until twenty more are taken.

FOR YOUNG CHILDREN HAVING CHILLS AND FEVER.

Recipe 3—Put 5 or 6 grains of quinine in a 2-ounce bottle, add one tablespoonful white sugar and sufficient licorice to hide the taste of the quinine and fill the bottle with water. Dose a teaspoonful each hour, commencing five hours before the chill is due, remembering that each chill comes one hour earlier than the one of the day before in chills and fever. After ten doses are taken, give a teaspoonful every morning before breakfast and at night a quarter teaspoonful of extract May-apple, prepared as directed on page 373.

FEVER AND AGUE CURE WITHOUT QUININE.

Recipe 4—Take fresh mandrake (May-apple) root, just dug from the ground, and squeeze from it $1\frac{1}{2}$ tablespoonfuls of juice, mix with the same quantity of molasses and divide into three doses, taking one each five, three and one hour before the chill. This may cause nausea, but is said to

be very successful as a cure, very rarely needing to be repeated.

This should be followed by a strong tea of dogwood bark, taken freely and regularly every day, for about ten to fourteen days.

TO PREPARE TINCTURE OF MAY-APPLE FOR USE IN RECEIPTS NOS. 1 AND 3.

Dig the roots in the spring of the year, when the flowers are on the plants, as at that time you can readily find and distinguish it.

It grows generally in low grassy places, and dies down completely in the summer, when it is hard to find. The root is the part used. It should be washed clean, and the moisture all dried out of it until it is brittle, then break it up and put it in a bottle, covering it either with whisky or alcohol diluted one-half with water. When well steeped the tincture will be ready for use. No person living in a malarial region should ever be without a supply of this medicine. A very small quantity, however, of the tincture is required for a dose. If taken in too large quantities, or too often, it might produce bloody dysentery or other serious disease, as it is quite drastic; but taken in moderately small doses its work is quiet and very beneficial. It is not remarkably unpleasant to take.

POKE ROOT FOR FELONS, SORENESS OF THE LUNGS, ETC.

For curing a felon or run-around, we have never found anything to work so like a charm as poke root. Take a good-sized piece of the root, bake it in the oven just as you

would a sweet potato, scrape it and bind it on to the ailing finger, and relief comes soon ; the felon goes away.

This application should be made just as soon as the finger becomes sore and you suspect a felon is coming, but if you have delayed it until the felon is well under way, the poke root will be found to give great relief and hasten the recovery. If the poke root cannot be obtained, a cornmeal poultice, wet up with *extract of phytolacca* (poke root), which can be had at any drug store, will answer the purpose nearly as well.

Extract of poke root taken internally in *very small doses* is an excellent remedy for loose influenza, colds and affections of the throat, such as diphtheria, glandular swellings, etc., in human beings, or given in proportionately larger doses to horses or dogs in epizootic or distemper. It should always be kept on hand by the farmer in the form of an extract, which is prepared by digging and drying the roots in an open stove oven until all the watery part is dried out, then cutting them up and putting them into a bottle and turning on sufficient alcohol, reduced with water one-half, or whisky, to cover the chips.

The extract of the black ripe berries of this plant gathered after the frost has touched them, is highly recommended as a remedy for chronic rheumatism. A dose is three or four drops in half a teaspoonful of water, taken three or four times a day.

CURE FOR RATTLESNAKE BITES, ETC.

We find the following in a periodical, and think it well worth trying.

"The value of earth as a disinfectant and deodorizer is well known, and the treatment of ulcerated sores and gan-

grenous wounds with it is becoming general. A new application has lately been made as follows: Clay as a dressing in cases of confluent smallpox (the meaning of confluent is running together and forming a general sore), dusting the face of the patient over with clay powdered fine as soon as the pustules are fairly developed. This forms a clear, dry and wholesome scab, absorbing the infectious material, and leaving the underlying skin in its natural and normal state. The painful itching was entirely abated. The earth used was fine pipe clay. In the case of rattlesnake bites it is invaluable. As the season of bites of reptiles is at hand I send you the following simple remedy. It is a plaster of clay, or instead of clay of common swamp or gutter mud, applied as soon as possible to the wound. I have tried it on myself. I was stung by a numerous swarm of yellow hornets about my neck and face, my sight being badly affected. I went immediately to a swamp near by and applied the mud from it and in half an hour I went to mowing again, the swelling having subsided. I knew a neighbor who was bitten by a rattle-snake some miles from home; his companion left him and went for help as soon as possible. It being just before night he was not able to return until morning. When going back he met the man returning, with the poison conquered. He had got to a swamp, dug a hole and inserted and buried the bitten place in the mud, that was all, and was saved."

TO KEEP HANDS AND FINGERS FROM CHAPPING AND CRACKING IN COLD WEATHER.

Buy a dime's worth of glycerine from the drug store. Wash and soak your hands well with good soap (that made with cocoanut oil is cheap and good), and warm water; then,

before washing off quite all of the soap, pour on to your fingers a few drops of the glycerine, sprinkle on a little water so the glycerine will not be of full strength, and rub it in well, drying your hands before the fire, leaving the soap and glycerine to dry in, not wiping it off upon a towel. The best time to do this is at night, just before going to bed, but any time will do, in fact two or three applications a day should be made until the skin is softened and the cracks disappear.

This treatment will give great relief, and in a day or two your skin will be soft and pliable, healed as no other treatment will heal it. However, if you prefer an ointment, the following is an excellent one, and may be used either in connection with the foregoing or alone. The two together will give immense relief the very first day applied, and cure entirely the worst case of chapped hands and fingers, in a week.

OINTMENT FOR CHAPPED HANDS, LIPS, Etc.

Take 5' drams of camphor gum, 3 drams white beeswax, 2 drams spermaceti, 2 ounces olive oil—put them together in a cup upon the stove where they will melt slowly, and form a white ointment in a few minutes. If the hands be affected, annoint them on going to bed, and put on a pair of gloves. A day or two will suffice to heal them.

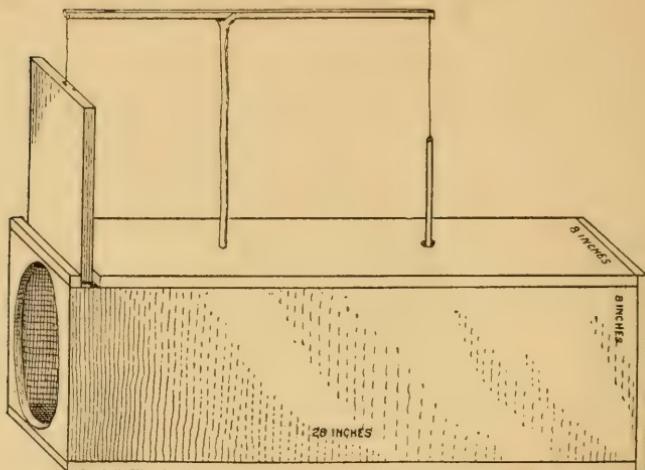
TO TRAP RABBITS.

Take weather beaten boards (new ones, being whiter, are more likely to scare the rabbits), four pieces 28 inches long, 8 inches wide. Nail the top and bottom pieces onto the side pieces so that the box is, say 6 inches wide by 8 inches high inside measurement. Close the back end by nailing on a piece of board; then bore two three-fourths or 1 inch

auger holes through the top of the box, one 8 inches from the front, and the other 10 inches from the back ends, and fit a stick about an inch in diameter and 16 inches tall, with a crotch at the top in the forward hole. Next cut a square or rather rectangular hole or slot through the upper board at the front or open end of the trap through which the door shall drop to catch the rabbit.

Another way is to let the top board be say 2 inches shorter than the bottom and sides and form the slot or opening by nailing on a cleat an inch wide across the top of the side boards at their extreme front ends. In either case slats should be also nailed up and down on the inner side of the side pieces outside the door, to prevent the rabbits pushing the door outward and escaping.

Now rig a stick, say half an inch in diameter, and about 18 inches long, tying a string to each end, attaching the trap door (size say $5\frac{1}{2} \times 11 \times 1$ inches) to one end and a piece of stick (a sliver from a shingle will do very well) say one-half an inch in diameter, and 12 inches long, to the other, the string being tied to one end of the stick, and the other stuck down into the back auger hole, in the top board and having a notch cut in it so that it can be hooked onto the under *foreside* of the top board sticking down through it some 4 or 5 inches. The long stick is now rested in the crotch of the perpendicular stick that was placed in the forward hole, and the strings being adjusted to the right length, they hold up the trap door until the rabbit entering the box to explore it and see what a snug, warm place it is to sleep in, pushes off the stick from its hold upon the under side of the box cover, and the weight of the trap door causes it to fall and shuts Mr. Rabbit in.



Remarks.—Do not have your trap too wide or the doorway too wide, the dimensions given are about right. Make it neat, tight, warm and comfortable. Set it with its door to the east or south, so that the cold winds cannot blow into it. You need not put any bait in, the rabbit will go into it just as well without bait as with. Set it near or in the customary haunts of the rabbits. Moonlight nights are the best, as rabbits always have fine gambols on such nights. Blacken the strings with ink or blacking, as rabbits are afraid of anything white. Perhaps a few cabbage leaves or turnip tops thrown in may be an advantage but we catch them readily with no bait at all. November 1 to March 1 rabbits are in season; during the summer their flesh is said to be "woolly." When in season they will be found excellent eating.

When the trap is sprung lift the trap door carefully a little way, put in your arm and pull "Bre'r Rabbit" out.

Do not move your trap around much, let it stay in one place a long time, so the rabbits will get used to seeing it

there. When you have caught the first one you are pretty sure to catch others in that trap.

TO KEEP RABBITS FROM TREES.

Wrap the stems to the height of 4 feet with thick paper, or wash the trees with a thick whitewash in which is mixed flower of sulphur and an ounce of carbolic acid in each bucketful of the wash, and rabbits will let the trees alone. Do not daub them with axle grease, or you will find the trees dead in the spring.

TRAPPING MINK AND OTHER ANIMALS.

In hunting their prey, such as mice and other "small deer," minks usually go along the side of streams instead of in the water and choose the brooks and rivulets, rather than the large water courses; a place where there is a thick growth of grass is a favorite haunt for them.

An excellent place to trap them is near where a little shallow brook empties into a larger one. Here, right in the course of the small stream drive down sticks or poles in the form of an \wedge with the top of the \wedge pointing up stream, forming thus a little pen with its open side toward the larger stream. Here, just at the mouth of this pen set, in the shallow water, a steel-trap without any bait upon it. The bait, which may consist of a piece of fish, chicken, chicken's head, or other fresh meat, should be placed in the far end of the pen (in the upper angle of the \wedge as it were) so that the animal will be obliged to step over the trap to reach it, and will be almost certain to spring it and get caught. The object in putting the bait beyond the trap is to lead the animal's attention *from* the trap and not *to* it.

Minks should not be caught in the South earlier than the middle of November, and later than this, in the coldest winter weather is preferable, as the fur not only of minks, but of all other fur bearing animals, is much heavier and better in the winter.

We omitted to say above that the trap should be chained to a stout sapling or stake driven very firmly into the ground at a point down the stream away from the trap and bait.

TO MAKE FISH BITE.

Mix the juice of loveage or smellage with any kind of bait, or put on a few drops of oil of rhodium. These will be found effectual, as fish are very fond of them.

TO KILL RATS.

Flour 1 pound, water sufficient to form a thick paste, then mix one-third ounce phosphorus in one-half ounce butter, warming them if too stiff, and mix with the paste. This should be spread on bread or made in balls and covered with sugar. If you wish to make this article to sell, you can disguise its composition by working into it pulverized tumeric. Or take warm water, one tumblerful; lard, one-quarter pound; phosphorus, one-quarter ounce, mix and thicken with flour. Make it up in these proportions in small quantities, as phosphorus loses its power by exposure.

TO KILL OLD SMART RATS.

Some old rats are so sly they will not touch the above, then take a few grains of strychnine and a little fresh, lean, broiled meat; cut the meat into small pieces, using a fork to hold it, for if held by the fingers the rats will smell them and not eat it. Cut the meat with a sharp penknife, and making

a small hole in the pieces insert a little of the strychnine and close up the holes again. Put these on a plate, but not too near the hole or they will become suspicious. It is well also to cover the plate with a piece of paper to make the rat think it is not intended for him.

TO DRIVE RATS AWAY.

Take pulverized caustic potash, which can be bought of almost any grocer for 10 cents per can, and put it into all their holes about the house, it becomes soft and pasty from the dampness in the air, and the rats will leave the premises rather than have this get on their feet or bodies.

TO KILL RATS RIGHT WHERE THEY EAT THE POISON.

Mix 2 ounces carbonate of barytes with 1 pound of grease. This produces thirst. Set a pan of water close by the poison and they will drink and die right there. This is a deadly poison, and care should be taken that no other animal gets any of it.



Dyeing.

We are of course well aware that the customary way of dyeing small quantities of goods is with the prepared package dyes sold by druggists; and these do very well where there is only a small amount of material to color; but sometimes, as in the case of dyeing carpet rags or men's clothing, it will be found too expensive to use the package dyes; and so we give here the methods and formulas used by professional dyers, or by our grandmothers in the old days of the spinning wheel and the hand loom.

HINTS ON DYEING.

1. Wash the article to be dyed thoroughly, with soap and warm water, and rinse perfectly clean.
2. Dip the article into warm water again just before putting it into the alum or other mordant preparation, this prevents its spotting.
3. In dyeing always use soft water.
4. After an article has been dyed it should be aired awhile, then rinsed and dried, pulling it out or ironing when nearly dry to prevent wrinkling.
5. Do not wring merino or silk goods, as this causes them to wrinkle and break.
6. Whenever you make a dye with logwood chips, either boil the chips half an hour, and pour off the dye, or tie up the chips in a bag and boil with the goods; or in the place of the logwood chips take $2\frac{1}{2}$ ounces of extract of logwood for each pound of chips, which is generally the better plan and far less trouble.
7. Remember, in judging of shades of color, that when damp in the dye, colors appear much darker than they do after the goods are dried out.
8. *To Make Extract of Indigo, or "Chemic,"* as it is called by dyers. Take oil of vitriol one-half pound, and stir into it 2 ounces of finely ground indigo, stirring it constantly for half an hour, then cover it over and stir it three or four times a day for two or three days; then put in a small pinch of saleratus or soda and stir it up, and if it foams add more soda until the foaming ceases; then put it in a glass bottle and cork it tightly. It improves by standing.

9. *To Make Muriate of Tin.* If the druggist in your neighborhood does not keep muriate of tin, you can make it yourself, as follows :

Get at the tinner's shop a piece of block tin (solder will not answer), put it in a shovel or iron ladle and melt it. After it is melted, pour it from the height of 4 or 5 feet into a bucket of water; the object of this is to have the tin in small particles, so that the acid can dissolve it. Take it out of the water and dry it, then put it into a strong glass bottle; pour over it 12 ounces of muriatic acid, then slowly add 8 ounces of sulphuric acid; this should be added about a tablespoonful at a time, at intervals of from 5 to 8 minutes. If it is added too rapidly the heat evolved will be likely to break the bottle. After you have all the sulphuric acid in, and the heat and motion has subsided, put in a stopper of glass and beeswax, and it will be ready for use in twenty-four hours, or will keep for a year or more.

COLORS.

BLACK, FOR FIVE POUNDS OF GOODS.

Recipe No. 1. Blue vitriol 6 ounces; boil it in sufficient water to soak the goods a few minutes, then dip them in, and soak them three-quarters of an hour, lifting them out to air them occasionally. Take logwood, 3 pounds, boil it half an hour, then dip in the goods and soak them in the dye three-quarters of an hour, airing them occasionally. After giving them a long airing, say of an hour, dip them again and soak three-quarters of an hour longer, and wash in a strong suds and dry. The color will not crock or fade in the sun.

BLACK, FOR WOOL OR WOOL AND COTTON GOODS.

Recipe No. 2. For 10 pounds of goods, bichromate of potash 4 ounces, ground argal 3 ounces; boil them together

and put in the goods, stir well and let them remain in the liquor four hours. Take out and rinse slightly in clear water; then, in another vessel make a dye with $3\frac{1}{2}$ pounds of logwood; boil it an hour and add one pint of chamber lye and let the goods remain in all night, then rinse in clear water.

DARK SNUFF BROWN, FOR CLOTH OR WOOL.

For 5 pounds of goods 1 pound camwood; boil it fifteen minutes; then put in the goods for half an hour; take out the goods and add $2\frac{1}{2}$ pounds of fustic, boil ten minutes and soak the goods three-quarters of an hour, then add blue vitriol, 1 ounce; copperas, 4 ounces; dip again half an hour. If not dark enough add more copperas.

WINE COLOR.

For 5 pounds of goods take camwood 2 pounds, boil fifteen minutes and dip the goods three-quarters of an hour, boil again and dip again half an hour, then add blue vitriol $1\frac{1}{2}$ ounces, and if not dark enough add copperas half an ounce.

MADDER RED.

For 5 pounds of goods $1\frac{1}{2}$ pounds of alum, cream of tartar 5 ounces, put in the goods and boil in the liquor half an hour, then take them out, air for an hour and then put them back and boil for half an hour longer; then empty your kettle, fill it with clean water, put in a peck of bran, make it milk-warm and when the bran rises skim it off, add half a pound of madder, put in your goods, let it heat slowly and come to a boil, then wash in strong suds.

OAK BARK GREEN.

Make a strong yellow dye with equal quantities of oak and hickory barks, add extract of indigo, one tablespoonful at a time, until the desired shade is secured.

FUSTIC GREEN.

For each pound of goods, fustic 1 pound, alum $3\frac{1}{2}$ ounces, steep them together until the strength is out, then put the goods into the dye, and let them remain until a good yellow is obtained, then remove the chips, and add extract of indigo, one tablespoonful at a time, until the color suits.

BLUE—QUICK PROCESS.

For 2 pounds of goods take 5 ounces of alum and 3 ounces cream tartar; add sufficient water to cover the goods and boil them in this for an hour, then remove the goods to a vessel containing warm water in which extract of indigo has been dissolved, more or less being used according to the depth of color desired, and boil them therein, adding more indigo if needed until the right color is obtained. This gives a good and permanent color.

COCHINEAL SCARLET.

For 1 pound of goods (yarn or cloth) take cream of tartar half an ounce, powdered cochineal half an ounce, muriate of tin $2\frac{1}{2}$ ounces, boil all together, then put in the goods stirring them about in it briskly for ten or fifteen minutes, then boil one and a half hours, stirring occasionally, slowly; then wash in clear water and dry in the shade.

PINK.

Take for 3 pounds of goods, alum 3 ounces, boil and dip the goods in the liquor one hour, then add 4 ounces of cream of tartar and 1 ounce of pulverized cochineal, boil them well together and while boiling dip in the goods until they are of the right shade.

ORANGE.

For 5 pounds of goods, six tablespoonsful of muriate of tin and 4 ounces argal; boil together, and as soon as it boils remove it from the fire and steep the goods in it for an hour, keeping it warm meanwhile; then add fustic $2\frac{1}{2}$ pounds, boil ten minutes, and put in the goods for half an hour, and then add to the dye one teacup of madder; heat it again and steep the goods half an hour or until the color is right. Cochineal used instead of the madder makes a much brighter color and should be used in small quantities until the desired color is obtained.

LAC RED.

For 5 pounds of goods take 10 ounces of argal, boil it a few minutes, then mix pulverized lac 1 pound, muriate of tin $1\frac{1}{4}$ pounds, in a separate vessel and let them steep two or three hours; then add half of the lac dye to the argal and steep the goods in it half an hour, then add the balance of the lac and steep the goods again an hour, keeping the goods at boiling heat until the last half hour when the dye may be cooled off. The goods should be aired occasionally all along through the process.

PURPLE.

For 5 pounds of goods take cream tartar 4 ounces, alum 6 ounces, pulverized cochineal 2 ounces, muriate of tin half a teacupful. Boil together the cream of tartar, alum and tin, fifteen minutes, then put in the cochineal and boil five minutes; dip the goods two hours. Then make a new dye with 4 ounces of alum, 6 ounces of Brazil wood, 14 ounces of log-wood, one teacup of muriate of tin, with a little extract of indigo. Work the goods in this until the desired color is secured.

**SILVER DRAB,
TO BE USED ON WHITE OR VERY LIGHT GOODS.**

For 5 pounds of goods one teaspoonful each of alum and pulverized, or ground, logwood. Boil well together, then dip in the goods one hour; if not dark enough add small quantities of alum and logwood until the desired shade is obtained.

COLORS FOR COTTON GOODS.

BLACK.

For 5 pounds of goods, take of green sumach wood and bark together three (3) pounds, boil half an hour, and let the goods steep twelve hours, then dip in lime water half an hour, take them out, hang them up and let them drip an hour; then add to the sumach liquor eight (8) ounces of copperas, and dip another hour; then run them through the lime water again for fifteen minutes.

Then prepare a logwood dye, using two and a half ($2\frac{1}{2}$) pounds of logwood, boiling it one hour, and soak the goods in it for three hours; now add bichromate of potash two (2) ounces to this and steep the goods again one hour, then wash again in clear cold water and dry in the shade; this will give a permanent black.

To prepare lime water to use in the dyeing of cotton goods as per the recipes given here put fresh quicklime into a bucket or tub, pour on water until it slakes, then fill up the tub with water, and when the chemical action is done, and the water is cold and clear, turn it off, and it is ready for use. Use one (1) pound of lime to the bucket full of water, or $1\frac{1}{2}$ pounds for *strong* lime water.

LIGHT BLUE, OR A GOOD BROWN.

For three (3) pounds of goods, take of blue vitriol four (4) ounces and boil it a few minutes in sufficient water to cover the goods, then soak the goods therein three hours and finish by passing them through a strong lime water, being particular that all parts of the fabric are equally exposed to the lime water. This color can be changed to a beautiful shade of brown by putting the goods afterwards through a solution of prussiate of potash.

BLUE, MADE WITH LOGWOOD.

If the goods are new, always boil them first in a strong soapsuds or weak lye, and then rinse them thoroughly in clean water. Then, for five (5) pounds of cotton goods, or three (3) pounds of linen goods, take three-quarters ($\frac{3}{4}$) of a pound of bichromate of potash, with sufficient water to cover the goods; then put in the goods, and let them steep two (2) hours, then take them out and rinse in clear water; next, make a dye with four (4) pounds of logwood; heat this and let the goods steep in it for an hour; air the goods about twenty minutes, and put them back in the dye to stay, say three or four hours. When the dye is cold take out the goods, rinse them well and dry them.

A CHEAP BLUE FOR CARPET RAGS, ETC.

For five (5) pounds of rags take copperas, four (4) ounces, boil and immerse the goods for fifteen minutes, then dip in strong soap-suds, and back to the dye two or three times. Then in another vessel make another dye with prussiate of potash, one (1) ounce; oil of vitriol, three tablespoonsful; boil the goods in this thirty (30) minutes, then rinse and dry.

GREEN.

If the cotton is new, boil it first in weak lye, or strong soap-suds, to take out the starch, then rinse and dry it. Then dip it in ordinary indigo bluing water, such as is used in washing clothes, only using more bluing and less water, so that the goods may have blue enough to make the green as dark as wished. Take out the goods and dry them. Then make a dye with three-quarters ($\frac{3}{4}$) of a pound of fustic and three (3) ounces of logwood to each pound of goods; boil this one hour, and when cool, so that the hand can be kept in it, put in the goods, moving it briskly about a few minutes in the liquor, then let it steep one hour, take it out and let it thoroughly drain. Then dissolve and add to the dye, for each pound of goods, half an ounce of blue vitriol, and dip the goods in another hour; then wring them out and let them dry in the shade. By using more or less of the logwood and fustic any shade of green can be obtained.

YELLOW.

For five pounds of goods, take seven (7) ounces sugar of lead and immerse the goods for two (2) hours. Then make a new dye with four (4) ounces of bichromate of potash, dip in the goods until the proper shade is secured, wring out and dry. If it proves not yellow enough, repeat the operation.

BRIGHT ORANGE.

For five (5) pounds of goods take four (4) ounces sugar of lead, boil a few minutes, and when luke-warm put in the goods, letting it remain two (2) hours, airing occasionally; then wring out. Make a new dye with eight (8) ounces bichromate of potash, and madder two (2) ounces, Dip the goods in this until the right shade is secured. If

the color should be too red, take off a small sample and dip it in lime water, when choice can be made of the original color, or that dipped in the lime water.

RED.

Take muriate of tin, three-quarters of a teacup, add sufficient water to cover the goods well, bring it to a boiling heat, then let the goods soak in it an hour, stirring frequently; take out the goods, empty the kettle, put in clean water and one (1) pound of nic-wood; steeping it for half an hour at hand heat, then put in the goods, increasing the heat for one hour, but not bringing it to a boil; then air the goods and dip an hour as before, and wash without using soap.

CHEAP DYES MADE WITH MATERIALS THAT ARE ALWAYS ON HAND ON THE FARM.

Why not use the materials that grow, or are to be had cheaply, on almost any farm in the South?

No. 1, for instance: *A good black dye*, for either wool or cotton, can be had by boiling sumach bobs, and adding a bit of copperas.

No. 2, for bright yellow: Take hickory bark and alum.

No. 3, for a good blue: By using bottle bluing, such as is used in washing clothes, having previously steeped the goods in warm water in which 5 ounces of alum and 3 ounces of cream tartar have been dissolved, a good blue color can be obtained.

No. 4: *A good green* can be had by dipping the goods, colored yellow by No. 2 above, into the blue dye.

No. 5, for lemon color: Use white clover blossoms and alum.

No. 6: For silk or woolen goods (not cotton) use peach leaves and alum. This gives a clear yellow.

No. 7: Copperas alone, boiled in water, will give a bright orange, or with copperas and lime a good brown.

By experimenting with other barks, woods and simple chemicals, it will be found that many other good colors can be produced at small expense.

CEMENTS.

CEMENT FOR QUEENSWARE, CHINA, ETC., WHICH WILL STAND HOT WATER.

With a small camel's hair brush apply a small quantity of white carriage oil varnish.

RUSSIAN ISIN-GLASS CEMENT.

For china, glassware, statuary, etc. Dissolve Russian isin-glass in pure soft water, by soaking for twelve hours, after which apply with a brush as above.

A CHEAP AND GOOD CEMENT.

Take oyster shells (fresh water clam shells are just as good) and burn them, forming shell lime; pulverize this very fine; then as required for use, mix into a paste with the white of an egg. Burn the shells only as wanted for use as they air-slack just as other lime does.

WATER PROOF CEMENT FOR LEATHER, BELTS, GLASS, CHINA, ETC.

Ale or beer 1 pint, best Russian isin-glass 2 ounces; put them into a glue kettle and boil until the isin-glass is dissolved, then add 4 ounces best common glue and dissolve it with the other, then add slowly 1 $\frac{1}{2}$ ounces boiled linseed oil, stirring it all the time until well mixed. When cold it will resemble India rubber. When you wish to use this, dissolve what you need in a suitable quantity of ale to the consistence of thick glue. If you cannot get ale or beer, use good vinegar. If

used on leather shave down the edges you wish to unite and apply the cement with a brush, always while hot, laying a weight upon the joint for six to ten hours until thoroughly dry.

CEMENT FOR FURNITURE, ETC.

To mend marble, wood, glass, china, etc. Water, one-third of a gallon; good glue, white is best for mending white ware, 1 pound, white lead $1\frac{1}{3}$ ounces, whisky 1 quart. Mix by heating the glue in the water, remove from the fire and stir in the white lead, then add the whisky which will keep it liquid, excepting in the coldest weather. Warm and stir it before applying.

WHITE CEMENT.

White fish glue 1 pound 10 ounces, dry white lead 6 ounces, soft water 3 pints, alcohol 1 pint. Dissolve the glue in the water in a tin dish, setting this in another dish containing water to keep the glue from being scorched. When the glue is all dissolved add the white lead and stir and boil until thoroughly mixed; then remove from the fire and when cool add the alcohol and bottle it while warm, and afterwards keep well corked.

IMITATION OF SPAULDING'S GLUE.

First soak the glue you wish to use in cold water, then in a glue pot, the inner one being of earthen or porcelain, put it over the fire and let it simmer, then add a little nitric acid, sufficient to give the glue a sour taste like vinegar, or say one-half ounce to 1 ounce to the pound of glue. The reason for using a porcelain dish to make it in, instead of iron or tin, is that metal would be corroded by the acid, making the glue black:

CEMENT FOR CANNING FRUIT.

Rosin 1 pound, lard, tallow and beeswax, of each 1 ounce. Melt all together, stirring at the same time, and use hot.

TANNING.**TANNING DEER OR OTHER SKINS.**

Remove the tags and ends (useless parts), then soak the skins soft, remove all adhering fleshy or fatty substances, and soak in warm water an hour. Take oil vitriol, 1 ounce; salt, 1 pint; milk, 3 quarts, and mix these together.

Dip the skin in warm rain water, to which 2 ounces sale-ratus, or sal-soda, or 1 ounce caustic lye, have been added, and work it well therein, say from five to ten minutes, until it is saturated with this liquid; then wring it dry and immerse in the vitriol mixture for fifty minutes, stirring it constantly; then wring and soak it again in moderately warm water, and finally dry, working and pulling it until it is soft.

TANNING FUR AND OTHER SKINS.

Prepare the skins as in the above recipe; then, after they have been soaked in warm water for an hour, take for each pelt, borax, saltpetre and glauber salts, half an ounce of each, and mix with a little soft warm water. Apply this with a brush upon the flesh side of the skins, putting it on thickest upon the thicker and best parts. Then double the pelts together, flesh side in, keeping them in a cool place for twenty-four hours, but not where it is cold enough to freeze.

Next, wash the skin clean and take sal-soda, 1 ounce; borax $\frac{1}{2}$ ounce; good white soap, 2 ounces (or in these proportions if more is required), melt them slowly together, *not allowing them to boil*, and apply to the flesh side with a

brush, as above; roll up again and keep in a warm place for twenty-four hours.

Again wash the skin clean as above, having 2 ounces of sal-soda dissolved in sufficient hot rain water to saturate the skin; then take alum, 4 ounces; salt, 8 ounces, and dissolve also in hot water, and as soon as sufficiently cool, so that you can bear your hand in it, put in the skin for twelve hours, then wring out and hang up over night or until dry. Repeat this last soaking and drying as many times as may be necessary to secure the softness of the skin desired.

Lastly, finish by pulling, working, etc., and finally by rubbing with a piece of pumice stone or fine sand paper upon the flesh side.

FOR FUR SKINS.

Another method. Weigh the dry skins before you commence operations, applying rancid butter or lard (any butter or lard will do), tramping the skins after they are well greased, in a tub, until they are oiled thoroughly. This process should take at least six hours. Take the skins out on to a block, table or smooth tree stump, and with a piece of hoop iron, scrape away all extraneous matter, fleshy parts, etc., from the grain (inner) surface of the pelt. Remove the grease by working the skin in very fine hardwood saw-dust. Do this near a fire, so that all may be warm; the fur should then be combed out with an ordinary dressing comb. Next, steep the furs for an hour in warm water, to which has been added for each pound of the dry skins, 1 pound each of bran, alum and salt; wring out and partially dry; then wash again in a strong, warm soap-suds in which about 2 ounces of pulverized sal-soda to a pound weight of dry skins have been dissolved. Wring out and rinse thor-

oughly in warm water, and dry and work the skins until they are soft and pliable.

TANNING DEER OR OTHER SKINS FOR MITTENS, GLOVES, ETC.

For each skin the size of a medium deer skin take a bucketful (say 10 quarts) of water and put in it 1 quart of quick lime; let the skins lie in it from three to four days, then rinse in clean water, remove the hair, scrape the flesh side clean, then soak them in cold water to get out the glue, and afterwards scour or pound them well in strong warm soap-suds for half an hour, after which take white vitriol (sulphate of zinc) alum, and salt, one table-spoonful of each to a skin; dissolve these in sufficient water to cover the skins, and let them soak in it for twenty-four hours. Now wring out as dry as may be, and spread on with a brush $\frac{1}{2}$ pint of currier's oil, and hang in the sun about two days, after which scour out the oil with soap-suds and hang out again until perfectly dry; then pull and work the skins until they are soft, and if in a reasonable time they do not prove soft, scour them out in suds again, as before, until they are so. The oil can be saved to be used again, by pouring or skimming it from the top of the soap-suds after it has stood awhile. The buff color is obtained by spreading yellow ochre over the surface, and rubbing it in well with a brush.

TANNING DEER SKINS WITH ACID.

After taking off the hair and preparing the skins as in the foregoing recipe, soaking and pounding in soapsuds, etc., in the place of white vitriol, alum and salt, take oil of vitriol (sulphuric acid) and water, equal quantities, and thoroughly wet the flesh side of the skins with it, using a sponge or cloth tied upon a stick, then fold up the skins and let them lie for

twenty minutes only, and have ready a solution of sal-soda, 1 pound to a bucket of water, and soak the skins in it for two hours, and then wash them in clean water, apply a little salt, and let them lie salted thus for about twelve hours; then remove all remaining fleshy matter by scraping with a blunt knife and when dry or nearly so, soften by pulling and rubbing with the hands and a piece of pumice stone, then apply yellow ochre, and brush it in well, to give the buff color.

This is the quickest method of tanning skins, for gloves, etc., and if they are only kept in the acid liquor twenty minutes the strength of the skin will not be impaired.

TANNING CALF, KIP OR HARNESS LEATHER WITHOUT BARK, IN FROM SIX TO THIRTY DAYS.

The skins must first be limed, haired and treated in every way as by the old process; then put into a vessel containing sufficient water to cover them, adding 1 pint of a composition made in the proportions for a 12-pound calf skin; of terra Japonica 3 pounds, common salt 2 pounds, alum 1 pound; these having been dissolved by boiling with sufficient water in a copper kettle; the same proportions being used for a larger amount of skins. When this composition is added to the water as above, it should be well stirred in, and the same amount should be added every night and morning for three days, pouring off a portion of the old into a separate vessel each time on adding the new, and at last pouring in the whole. The skins should be "handled" each day in the liquor, so that all parts may be equally exposed. The liquor can be used over again on other skins by adding half the quantity each time, of new liquor, keeping the same proportions for any amounts, and if you wish the

leather to have the customary bark color, put in 1 pound of Sicily sumach.

Kip skins by this process require about twenty days, and light horse hides thirty days, to make good leather; calf skins from six to ten days only. Japonica comes in large cakes of about 150 pounds, and sells at 4 cents per pound in New York City.

The Canadians make four liquors in using the Japonica, using for the first liquor for twenty sides of upper leather 15 pounds of Japonica in sufficient water to cover the skins.

The second liquor contains the same amount of Japonica and 8 pounds of saltpetre. The third contains 20 pounds of japonica and 4½ pounds of alum, and the fourth liquor contains 15 pounds of Japonica and 1½ pounds of sulphuric acid, the leather remaining four days in each liquor, but for sole leather the time and quantities are both doubled. Fifty calf skins are counted equal to twenty sides of upper leather, but let them lie in each liquor only three days.

The *Scientific American* in an issue of many years ago has the following in regard to this or a similar process:

"We have received from Edwin Daniels, of Elkhorn, Wis., a sample of calfskin 'upper leather,' tanned by a process for which a patent was issued to him on the 6th of January last. It is well tanned, firm, yet soft and elastic. No bark was used in preparing it, and the inventor informs us that the outlay of buildings and fixtures is just about one-tenth that of tanning with bark, only one vat being required for every ton used in the common process.

"Catechu (old *terra Japonica*) contains more tannin than any other substance employed in the manufacture of leather; hitherto, however, it has not been used for making

the best qualities of leather, because it rendered the skins tanned by it brittle, and liable to crack. This defect has been overcome by Mr. Daniels, who employs it as the principal agent in his process, combined with the sulphate of aluminum, the nitrate of potash, and acid, by which the skins and hides are 'plumped' in a high degree, and the tannin made to combine with the gelatine, in proper proportions to form soft and firm leather, susceptible of a fine finish, free from brittleness, and not liable to crack.

"Catechu comes to us from India in the form of a concentrated crystallized extract; it has simply to be dissolved in warm water, and is then ready for use. Considerable machinery and apparatus, such as bark, mills, etc., required for bark tanning, are unnecessary for this process."

There is no patent now in force on the above process. Any one can use it freely.

TO SALT BEEF TO KEEP A LONG TIME.

First thoroughly rub salt into it, and let it lie twenty-four hours to draw off the blood. Have ready a pickle, prepared as follows: For every 100 pounds of beef use 7 pounds of salt, one (1) ounce of saltpetre and cayenne pepper, one (1) quart of molasses, and eight (8) gallons of soft water; boil and skim well and when cold pour over the beef and put a heavy, smooth stone on it to keep it down. Meat thus prepared will keep a year or more, by taking the brine off occasionally, scalding it and when cool pouring it back over the meat.

FOR CURING, SMOKING AND KEEPING HAMS.

Rub and sprinkle the hams with salt, pack them closely in a barrel and let them lie three days; then turn off all the

brine which has formed and cover them with a brine made as follows: Take water sufficient to cover, add salt until strong enough to bear up a sound egg, or a potato; then for twenty-five to thirty hams take one-fourth of a pound of salt-petre and 1 gallon of molasses (or 10 pounds of brown sugar); let them remain in this brine six weeks. Then take them out and hang them up to drain; then before they get fully dry, say in a few hours, rub the flesh side, and the end of the leg with a very finely pulverized black or red pepper, the pepper should be as fine as flour, and should be carefully applied so as to cover every fleshy part, then hang them up and smoke them, and they will keep perfectly in a cool place, such as a good smokehouse or any other cool, shady place, where rats cannot get them. They will be found excellent eating.

TO KEEP HAMS SWEET ALL THE FOLLOWING SUMMER.

After curing them as above, pack them in barrels or boxes, and cover them with finely pulverized charcoal; they can be kept thus not only one year but two, or even three, if in a cool, dry place; in fact, it is stated that if they have been previously well dusted and covered with pepper, they will keep almost any length of time, if packed in well pulverized charcoal, even though the weather may be hot and the flies thick as in Pharaoh's time.

TO KEEP HAM IN SLICES A LONG TIME.

A number of years ago the *Rural New Yorker* published the following, which is said by those who have tried it to be very effectual and excellent:

"In the spring, cut the smoked ham in slices, fry until partly done, pack in a stone jar alternate layers of ham and

gravy. If the ham should be very lean, use lard for gravy, but in that case be sure and fry the ham in the lard, so that it will be well seasoned. When wanted for use, take up and finish frying, and it is ready for the table."

In this case the jars should be kept in a cool place or cellar, and a couple of thicknesses of clean cotton cloth put over the tops, before putting on the covers.

Pork killed in the fall or early part of the winter, after salting it and letting it lie in pickle (salt) about eight or ten days, can be treated in this manner, and will, if sliced and packed away in its own gravy or lard as above, keep splendidly until wanted for use. No bone should be put in, either of hams or pork.

HOME MADE SOAPS.

TO MAKE SOFT SOAP FOR WASHING CLOTHES, ETC.

First, set up a leach barrel. This is done with an old flour or salt barrel; bore a few holes in the bottom or just above the lower hoop; build a platform of boards on which to set the barrel, sloping these to the front so that this will be about 3 or 4 inches lower than the back, but be sure and have the front edges of the boards high enough from the ground so that you can set underneath a bucket or trough to catch the lye. It is well to have this platform double, so that all the lye will run down the boards and find its way to the trough. The barrel should also be set up near the well or spring so that you do not have far to carry the water.

Place the barrel on the platform, put a few sticks of wood or large brush criss-cross at the bottom, put in a little straw and a few chunks of fresh stone lime and fill the barrel nearly full of fresh wood ashes; pour on water gradually, and save the lye in a tight barrel, and with this and grease

about in the proportion of 2 pounds of grease to a gallon of good strong lye, make your soap either by the cold process, which is just to turn the lye on the grease in a barrel and let it stand until it "makes itself," or cook grease and lye together in an iron kettle.

The lye when it runs first from the leach barrel will be of a coffee color, but at last will grow light colored and is of course weaker. When it thus shows that the strength of the ashes is gone, empty the barrel and put in fresh straw, lime and ashes as before.

In making the soap, by cooking the lye and grease together in a kettle the strength of the lye is rapidly increased by the evaporation of the watery part of the lye, and by putting in the grease gradually you can ascertain just how much of the latter is required. No general rule can be given for the proportions of lye and grease, as this depends upon the strength of the lye. By cooking you can make the soap much quicker than by the cold method. When the soap is made it should be in a thick jelly, and will be found excellent for washing clothes and for general cleaning purposes; but hard soaps are better and more convenient for toilet purposes. In a timber country where ashes are plentiful, and the farmer raises his own meat and has plenty of surplus grease, he should always in the winter time make his own soap, both soft and hard. Soft soap may be kept well in a fish or other tight barrel, or half barrel, covering it with a piece of cloth or sacking, and this with a board cover; this keeps out dirt, insects and rats; then store the barrel in your cellar, barn, smokehouse or kitchen, and by keeping it

replenished your wife should always have plenty of good soap that has cost almost nothing.

HARD SOAP, A GOOD ARTICLE.

Take sal-soda and lard, of each 6 pounds, stone lime 3 pounds, soft water 4 gallons. Dissolve the lime and soda in the water by boiling; then let this settle, pour it off and return to the kettle, which should be either brass or copper; add the lard and boil until the soap is formed; then pour it into a dish or mould, and when cold cut it into bars, or cakes, and dry them. This will be found to be an excellent soap for any purpose, and especially so for toilet use, and is in fact a good shaving soap, as it does not irritate the skin, as ordinary soaps often do. It can be perfumed with sassafras or other oils; or a clean piece of sassafras root boiled in the water before the grease is added, will give it a pleasant odor; or an extract of sassafras root can be made by using a little water, and this stirred into the soap just as it is cooling.

WHITE HARD SOAP.

Fresh quicklime, sal-soda and tallow, of each 4 pounds; dissolve the soda in 2 gallons of soft water; now mix in the lime, stirring it occasionally for a few hours; when it is cold and has settled, pour off the clear liquor, put in the tallow and boil until it is all dissolved, then turn it into a box or pan, and cut it into cakes or bars as you prefer.

In making yellow soap, rosin is used with the tallow, in the proportion of one-third rosin to two-thirds tallow, the process being otherwise the same.

Quicklime must always be used in soap making when either sal-soda or lye is used, to make them caustic, so that they will cut or "eat up" the tallow. In making soft soap any

kind of grease can be used, pork grease, fresh or salt, etc., but in making hard soap, good tallow or lard is required.

ANOTHER WAY TO MAKE SOFT SOAP.

Take six (6) pounds of potash, four (4) pounds of lard, $\frac{1}{4}$ pound rosin; pulverize the rosin and mix all together, and set them aside for five days; then put the whole into a cask containing 10 gallons of warm water, and stir it twice a day for ten days, and you will find you have 100 pounds of excellent soft soap. You can easily figure out what this will cost you, probably, counting the lard as worth 10 cents per pound, and the potash at the same price, about \$1; or 1 cent a pound for the soap.

GRAFTING WAX.

Green, of Rochester, N. Y., has the following:

Take 4 parts rosin, 2 parts tallow, $1\frac{1}{2}$ parts beeswax; melt all together and pour into cold water; then work same as molasses candy.

FOR ROOT GRAFTS.

Four parts rosin, $2\frac{1}{4}$ parts tallow, three-fourths parts beeswax.

Cole recommends "to apply a thin layer of composition covering the scion on the side and cleft in the stock, and a cap over the top of the stock, pressing it closely and tightly around the scion, to exclude the air and water; pressing it also closely on the top of the stock and into the cleft, and around the scion, at its junction with the stock."

Sometimes strips of soft, old muslin are used, that have been soaked in melted grafting wax, and these are bound about the scion and over the top of stock which has been cut

off; and if any cavities or spaces are left, not covered by the strips, grafting wax is applied to fill them.

SPRAYING RECIPES.

For Fungous Growths, such as apple scab, bitter rot, leaf blight, or mildew, use for first spraying in the spring, before the leaves start,

COPPER SULPHATE SOLUTION.

Copper sulphate (blue stone).....	1 pound.
Water.....	25 gallons.

The copper should be pulverized and mixed first in a little boiling water, and when completely dissolved, turned into a barrel containing the balance of the water. This is for the *first* spraying only, before the leaves are open.

BORDEAUX MIXTURE.

For second and third, or fourth sprayings:

Sulphate of copper (blue stone).....	6 pounds.
Fresh (quick) lime.....	4 "
Water.....	50 gallons.

Dissolve the copper in 4 gallons of water, (after having pulverized it), in a tub or barrel. Then slake the lime with water in another barrel or wooden vessel, and strain it into the barrel containing the copper solution. Strain it carefully, so that the mixture may be perfectly smooth and fine, so as not to clog the sprayer; then add the balance of the water.

This is the great main reliance, in fighting all fungous diseases, whether on grape vines, fruit trees or small fruits. If you wish at the same time to destroy insects, such as apple worms, the codling moth, etc., add about a quarter of a pound of Paris green or London purple to the barrel, 50 gallons, of the mixture. In spraying, where use is made of those two latter substances, care must be taken not to allow

any animals to have access to the preparation, as both are arsenites and deadly poisons. For this reason also no trees or vines should be sprayed with them while in blossom, as they will kill the bees, who are the fruit raiser's best friends. Therefore see to it you do not use the arsenides either singly or in connection with fungicides until after the blossoms have fallen.

If fresh (quick) lime cannot be had, 6 pounds of partially air slackened lime may be used, but the fresh lime is much preferable. In using Bordeaux mixture on peach or plum trees add one-third more lime (See also page 409).

AMMONIACAL SOLUTION OF COPPER CARBONATE.

For late spraying, *this* is sometimes used:

Copper carbonate.....	5 ounces.
(Not the sulphate, as in the foregoing receipts, but the carbonate.)	
Aqua ammonia	3 pints.
Water.....	45 gallons.

Mix the copper with enough water to form a thin paste, then add the ammonia, and if this does not dissolve the paste add more water until dissolved, then add the remainder of the 45 gallons of water. Insecticides can be used with this, just the same as with the Bordeaux mixture above.

INSECTICIDES.

KEROSENE EMULSION.

Kerosene	2 gallons.
Common or whale oil soap.....	1/4 pound.
Water	1 gallon.

Heat the water; slice the soap thin, and dissolve thoroughly in it; then add this boiling hot to the kerosene, and churn the mixture by pumping it through a sprayer until a cream is formed (say for ten minutes). This to be diluted with water, as follows:

If the water is hard or limy, add a little lye or bicarbonate of soda. For scale insects dilute this emulsion with nine parts of water. For most all other insects dilute with fifteen parts of water. For plant lice and other small and soft insects, dilute with twenty-five parts of water.

A *milk emulsion*, prepared with sour milk and soap, is produced by the same method as above, but is not as generally used or liked. It soon ferments and spoils.

TOBACCO SPRAYING MIXTURE.

Tobacco, or stems of tobacco	1 pound.
Water.....	2 gallons.

Prepare by boiling the stems or refuse tobacco in the water, and apply by spraying. Said to be useful on cabbage, cucumbers and other young plants attacked by flea beetles and on house plants infested with aphides (plant lice), etc.

CARBOLIC ACID WASH.

Hard soap.....	1 pound.
Water.....	2 gallons.
Crude carbolic acid	1 pint.

Dissolve the soap in the boiling water and add the acid.

This wash is used against scale and bark lice on trees; apply with a stiff brush. Also used to prevent borers from puncturing the bark to deposit their eggs. In this case apply with a cloth early in summer, and again in July. Apply to the trunks and lower limbs, *but not to the foliage*.

WHITE HELLEBORE.

A vegetable poison. Used either as a dry powder or with water. When used dry, mix the poison with four or five times its bulk of flour, and dust or sift over the plants.

With water use one heaping tablespoonful to 2 gallons of water. Keep the powder in an air-tight vessel as it loses strength by exposure.

Used mostly for insects infecting small fruits, such as berries.

ACETATE OF LEAD—SPRAYING MIXTURE.

Acetate of lead.....	11 ounces.
Arsenate of soda	4 "
Molasses	2 quarts.

Add the above to 150 gallons of water, mixed conveniently in a hogshead.

This mixture is lately introduced, to be used against biting insects, such as the codling moth, apple worm, etc. It is a very cheap insecticide, remains in suspension in the water and seems to have no bad results. It remains on foliage, etc., a long time, even after quite heavy rains, and so it would not be best to apply it late in the season when fruit is ripening.

For the Colorado potato beetle three-fourths of a pound of the poisons combined, in the proportions given above, to 150 gallons of water have proved effectual.

MAKING VINEGAR.

Any one who raises apples, peaches, berries or grapes, should own a screw press, to express the juice from such fruit as is not marketable, and from apple parings, cores, etc. This expressed juice should be put in a clean barrel laid on its side with the bung out, the bung hole being covered with a small piece of netting to keep out insects. This gives the start for vinegar making. Water and sugar, or molasses, in the proportion of 10 pounds of sugar or 2 gallons of molasses to 4 gallons of water, may be needed as a reinforcement.

To make the vinegar stronger add more sugar or molasses. The best time to make vinegar is in warm spring and summer weather, and the best place is in a warm, dry room, shed or barn. It should not be allowed to freeze in the winter or the strength will be taken out of it. Once established it can be kept up permanently, by additions of juices or sweetened water, whenever it gets at all low in strength or quantity; add to it always while there are several gallons left in the barrel. The bung should never be put into the barrel. If by evaporation the vinegar gets too strong, reduce with water. A faucet should be put in the lower part of the head so the vinegar can readily be drawn.

CHEAP WHITE PAINT WITHOUT LEAD OR OIL.

Freshly slacked lime, 2 ounces; whiting, 5 pounds; put the lime in a crock or bucket, pour upon it two quarts of skimmed milk and stir well, then stir in the whiting gradually. Thin as may be required, with water or skim milk. Colors may be added if desired. This wash gives a bright clear paint, like body, and will last for many years.

NUMBER OF PLANTS AT A GIVEN DISTANCE, PER ACRE

RULE—Multiply the distance between the rows by the distance between the plants in the row, which gives the number of square feet occupied by each plant; divide the product into the number of square feet in one acre (43,560), and the result will show the number of plants on an acre.

EXAMPLE—If cabbage plants are set in rows three feet apart and the plants two feet apart in the row, each plant will occupy three times two, or 6 square feet of surface. Hence, one acre will require as many plants as six is contained in 43,560, or 7,260 plants.

Notes and Comments.

CRIMSON CLOVER.

In regard to crimson clover (page 30), we find that when a *spring* sowing of this plant is followed by a dry spell in April and May, the growth is much retarded, and a failure may be looked for. It is therefore advisable here in the South to *sow in the fall*. Fall or winter sowings are undoubtedly best in the South for most all grasses and clovers.

DEEP PLANTING OF IRISH POTATOES.

There are drawbacks in the deep planting of Irish potatoes. (See page 90). It is an expensive mode. The deep trenching takes time, and time is money. Then the hauling of trash to cover with, involves considerable labor, while the digging of the crop out of the deep trenches is also expensive. It may be questioned whether increase of yield will pay for the extra work. Six to seven inches deep is probably the best and most profitable depth at which to plant.

CRAB GRASS AND COWPEAS FOR HAY.

We wish to emphasize strongly the growing of this excellent combined hay crop as recommended on page 24. Handling land thus will transform millions of acres at the South into cattle and butter and cheese districts. We hope our farmers will not forget this superb means of supplying themselves with fodder at small expense.

SPRAYING PEACH AND PLUM TREES.

(Page 232). We are assured by those who have had the most experience, that no harm comes to peach or plum

trees in the use of Paris green or London purple in connection with Bordeaux mixture, even where 4 ounces of the poison are used to 50 gallons of mixture if the quantity of lime is increased to 6 pounds. The lime preventing the deleterious effect of the arsenite upon the foliage.

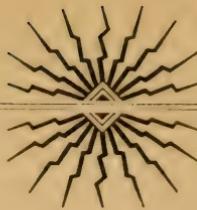
To be handy for spraying, these trees should be trimmed back to low heads, letting this be done in winter or early spring, before sap rises.

THE COLORADO POTATO BEETLE.

(See page 103.) Where the farmer is not provided with spraying pump, common garden watering pots will answer very well for potatoes. If your patch is large, and water not convenient, a great many worms can be killed by the use of dry Paris green, mixed with flour, dusted on *early* in the morning when the dew is on the plants. This is much easier than spraying, but not quite as effectual.



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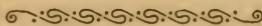
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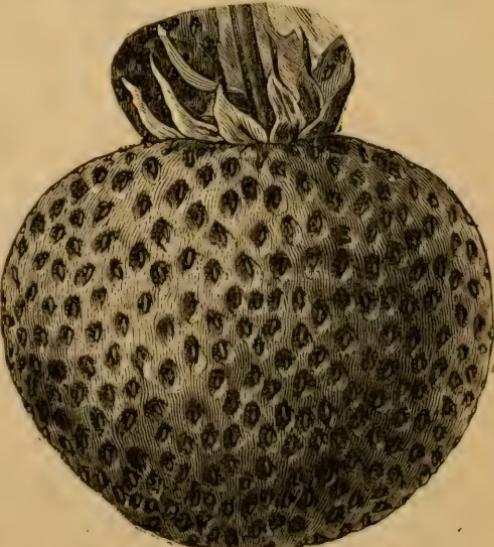
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